A Database Publication

THE MICRO USER

Volume 9 Number 1 March 1991 £1.50

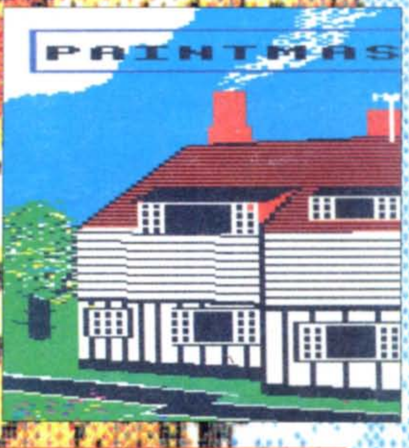
Now in our 9th YEAR

WORD POWER
Two ways to better text on the A3000

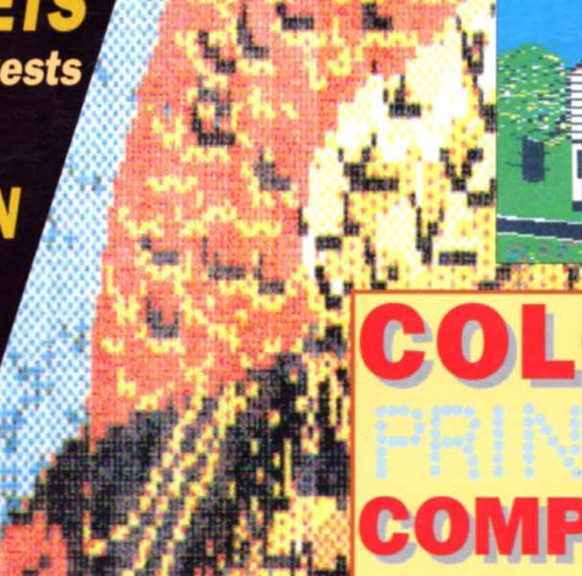
WORKSHEETS
Create spelling tests on your micro

PROTECTION
Stop unauthorised Arc disc accesses

Power play
Stay on top in Sim City



COLOUR PRINTERS COMPARED



REVIEWS
- SoundSpace
- RoboLogo
- Protext 5
- Tiny Logo
- Tiny Draw
- Ovation
- Magpie
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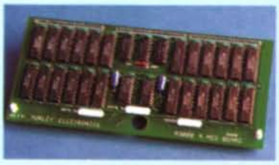

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- A must for all serious Archimedes owners.
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- Power supply
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SPECIALS

23 **Colour printers**
We give tips on how to get the best out of two colour printers.

27 **Sim City**
Find out how to succeed in this ultimate simulation of a human enviroment.

49 **Bad characters** *
What stops perfectly legal programs failing on the Master? Find out here.

55 **Short** *
Any number that's not a prime can be made from a product of primes.

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue. *Get it right* ✓

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 82 to find just what you're looking for – from cheap modems to complete computer systems.

Education

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We report on the software for Acorn machines on offer at this years BETT show.

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We look at how the development of software and hardware affects special education.

Alfred - the robot arm

Fun and adventure for slow readers

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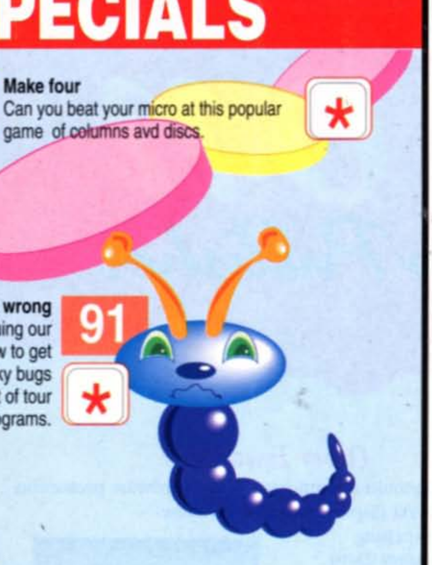
SPECIALS



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Heralded as the professional desktop publisher we check out its features

62 **Protext 5**
We review this popular word processor that's finally made it to the Archimedes.

COMPETITION

Fantastic prizes in our 8th birthday competition

You have the chance to win one of our worth a total of over £1300 Turn to page 64 to find out how you can win.

FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- Worksheet generator
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- Advanced trace utility
- Virus killer!
- Spark plugs

PLUS:
1.4 Mb of PD software

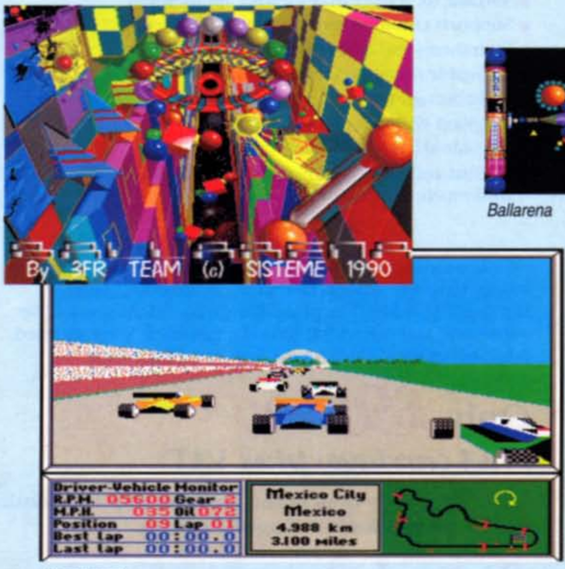
THE MICRO USER
THE MICRO USER

For new subscribers there's a special gift: A free binder to keep your copies of The Micro User.

Find out how to subscribe on Page 96

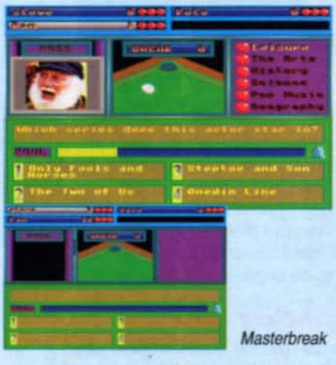
SOFTWARE SCENE

16 **Our mega-reviews issue presents five busy pages delving into the latest games releases**


By 3FR TEAM (c) SISTEME 1990
Driver-Vehicle Monitor
R.P.M. 05600 Gear 2
M.P.H. 035 Oil 072
Position 09 Lap 01
Best lap 00:00.0
Last lap 00:00.0
Mexico City
Mexico
4.988 km
3.100 miles

Powerbamd

Ballarena


Leisure
The Arts
History
Science
Pop Music
Geography
Which series does this actor star in?
Only Fools and Horses
Steptoe and Son
The Two of Us
Onedin Line

Masterbreak

Body Building 51 • Problem Solved 47 • Letters 86 • Mad Hatter 102

Key to which micro articles are suitable for

	Electron
B	BBC B
+	BBC B+
M	Master 128
	Master Compact
	Archimedes series and BBC A3000

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Ovation provides a single solution to all of your desktop publishing and word processing needs. Combining the most useful and powerful features from DTP systems costing much more, you will find Ovation has just about everything you could want. Ask your dealer for a demonstration – you won't be disappointed.

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Text may be typed in straight away just like a word processor, without the need for any complicated frames or styles. When a page is full, text will simply flow onto the next page. In addition you may add any number of frames to the page, each with its own 'story'. Frames may be linked together causing the 'story' to flow from frame to frame.

Adding Style

A 'style' is the font, size, justification, leading, indent etc. of a piece of text. Ovation allows any number of styles to be defined, named and then applied to paragraphs at the press of a key. Styles may be re-defined at any time, and the changes will automatically flow through the entire document. In addition, local styles may be applied to any highlighted block by simply selecting the font, size, style and format from the menus.

Ovation: Introduction

Frame Handling

Ovation has many advanced frame features, such as linked text frames with auto-flow, repel text, definable frame borders and a step-and-repeat facility. Unique on the Archimedes, is our parent/child system for frames and lines. This system allows you to copy and paste frames with embedded child frames and lines, as single items. This allows diagrams, forms, tables etc. to be copied or moved with ease.

The Instinctive DTP

Ovation is supplied with a tutorial and complete user guide, although you probably won't need to refer to it very often. Ovation makes full use of the RISC OS multi-tasking environment to provide a formidable array of features that are easy to learn and instinctive to use. A quick reference card is also included, which lists all the keyboard and mouse short cuts.

Other Features

- Multi-tasking/multi-documents
- No hardware protection
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- Fast built-in spelling checker (requires 2Mb)
- Printer drivers for Epson, PostScript, LaserJet, and Integrex printers
- Import Draw and Sprite files. Features include scale, crop, fit-to-frame
- Master pages for each chapter
- Cut/copy/paste using clipboard
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- Find and replace
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- Variable (& fractional) font sizes 1pt to 500pt
- Supports coloured text; frames and borders
- Stylesheets and customised start-up
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- Supplied with full range of clipart
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And much, much more......

Ovation: Introductio

Excellent Value

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News BEAT

Taking a short cut to the arcades

SETTING out to create your own arcade game can be a daunting task, so Alpine Software (0762 342510) have come up with Creator for Archimedes owners who want to produce their own without typing in endless listings.

A fully Risc OS multi-tasking application, the mouse-driven program allows users to design sprites in Paint or any other suitable package loaded into Creator's sprite window.

Featured is an object designer window where sprites can be dragged to create objects and where their behaviour can be set.

This includes speed and positioning of objects, bouncing off the screen, gravity, flight paths and homing in on other objects.

Each background sprite can be allocated to one of eight different layers which can be scrolled separately to provide a parallax effect where nearby objects appear to scroll past faster than distant ones.

Moving objects created with the object designer can also be allocated to any of the eight layers so thay may pass in front of or behind background objects.

With each layer, the whole screen can be scrolled horizontally, vertically or diagonally and there is no limit on the amount of screen which can be created.

Game characters' movement is controlled by a path designer which is also mouse driven and an event manager handles what actually happens in the game.

Once created, a game can be run without loading Creator and can be marketed without copyright problems. Creator will cost £38.95.

Newton & Brewer
Technology Services
UNIT 16
353) 666011
ACORN DEALER

Million dollar dealers collect the big bill

ACORN distributor Kelator have presented one of their dealers with a million dollars. Trouble is, the bill is a framed one which is not negotiable.

But the recipients, Newton & Brewer Technical Services, are not complaining. As the first Kelator dealer to reach their target in a unique incentive promotion, they have been granted "millionaire status" and receive a free weekend to live like millionaires in Paris.

Martyn Newton and his wife will fly out first class, have a limousine at their disposal, stay at the plush Georges V hotel and dine at the Moulin Rouge.

Two hundred dealers are taking part in the Millionaire Club promotion launched by Kelator and stand to win a host of luxurious holidays or valuable prizes.

"Many purchasers of Acorn product would be unaware of the benefit that the Kelator Millionaire Club has brought", said general manager Ian Goodall.

"This trade-only promotion has encouraged many Acorn dealers to stock a much wider range of peripherals and software". Pictured handing over the million dollar bill and a certificate to Martyn Newton and Ray Brewer are Tony Wood and Ian Goodall.

Slogger surfaces again

ELECTRON software firm Slogger are alive and well in Cornwall. Having apparently disappeared from the computer scene for more than a year, Slogger have resurfaced in Penzance with the launch of one new Electron product and a second under development.

"We moved to Cornwall in August 1989 expecting to settle into a new industrial area after only a short delay while work was finished", said Slogger's Andrew Hildig.

"I have been waiting for one year and three months for this place to be finished and I'm not pleased about it. Now the building has been fitted out and we are back in business again".

He filled in the waiting time by developing Click, a comparatively sophisticated Electron product working in a transparent operating environment to offer organiser facilities, file management features and more.

Click is supplied in a standard Acorn cartridge and contains the program on a 32k rom and 32k battery-backed ram with calendar clock and rechargeable battery.

Its appointment book takes up to 256 entries of date, time and messsage which can be loaded up to three years in advance and will interrupt normal working to display the message.

The address book facility takes up to 256 entries of

➤

New name on the Acorn scene

A NEW Cambridge-based company has been launched catering for the Acorn market. Iota Software (0223 421542) plan to bring out four products for the Archimedes and BBC 3000 ranges during 1991.

Marketing manager and founder of Iota Adrian Critchlow formerly worked in Acorn's Consumer Marketing department. He has been joined by an accountant and three Risc OS programmers.

First off the Iota production line is The Junior Database, a package designed to be easily used by young people although still offering comprehensive facilities.

Suitable for all subjects across the National Curriculum, it allows pupils to create graphs from data and produce them in draw format so they can be used in desktop published reports.

An interesting feature of The Junior Database is its hot linked tutor which eliminates the need to plough through a manual and takes the user through each stage of operating the database.

The Junior Database has a recommended retail price of £60.95 and an education price of £45.95.

Also new from Iota is Touch Type, a desktop typing tutor with more than 30 exercises, instructions on fingering and on-screen guidance so there is no need to look at the keyboard.

A separate window provides advice on which fingers need more practice, details of typing speed, accuracy and other pointers for improvement. Sound effects can be switched on and off and a voice can call out letters.

The tutor has been designed for use by colour blind people and, with some initial help, by the blind.

Recommended retail price £49.95, education price £39.95.

"Junior Database and Touch Type have already been well received, particularly at the BETT Show", said Adrian Critchlow. "Both packages will be available in French and German versions before July. Our other two products will be announced later in the year".

Easy path to better spelling

HOME micros are being recruited in the fight against bad spelling following Education Secretary Kenneth Clarke's instruction that school examiners deduct up to 5 per cent of GCSE marks for bad spelling.

Now Database Publications have announced the release this month of an all-formats computer program to teach spelling to children from 5 to 15.

The program, which has a vocabulary of 5,000 words, is designed to improve the spelling of children of all abilities and in all subjects.

It contains all the basic words they will need to be able to spell during their school career if they are not to be penalised in exams.

SPELL! has been devised by Peter Davidson, former head of computing at a Manchester comprehensive school and now editor of the world's first computer comic, *Let's Compute!*

It has been programmed by a team of teachers headed by Chris Price, one of the authors of Britain's top-selling educational software, Fun School.

The program runs on the entire Acorn range and most other popular home computers.

The £8.95 SPELL! package consists of five different programs, all of which use the inbuilt vocabulary

Image scanner for the Arc

WATFORD Electronics (0923 37774) have brought out a versatile new image scanner for Archimedes machines. The Archi A4 Scanner can be used hand-held or with its own 10 page automatic document feeder. It comes complete with Rom-based podule software.

Features include the ability to zoom in on an image, invert it in both X and Y directions then save and print the created sprite. Its 212mm scanning width can cope with desktop scanning of single sheets, photographs and diagrams. It can be detached from the feeder for use on large documents and pictures.

ARIES FAX LINE

The optional base eases scanning

A major feature of this new device is that, unlike other Archimedes scanners, it needs only one connection lead. There is no need to plug the hand-held section into the base then the base into the podule. Both base and hand-held units have a special sensor which operates them fully automatically.

Resolution can be controlled in increments of 10 dpi from 100 to 400 dpi, with 64 levels of grey scaling. A built-in shading contoller and manual brightness control are included to ensuring image clarity.

The scanner uses a yellow/green source which improves the contrast between light and dark and helps stop red-based colours being faded down to white.

Interactive help is supplied using the !Help facility on Acorn's applications discs. The scanner alone costs £349 and the feeder £95. The combined price is £399.

FROM PAGE 7

names, addresses and telephone numbers stored in alphabetical order and with a print-out option.

The calendar display is shown in seven horizontal days with successive weeks on successive lines. A mark adjacent to any day with an appointment can be scanned using the cursor.

Click's ADFS utilities support a number of functions such as EXTREE, a tree structure of directories, sub-directories and catalogues, a non-memory corrupting FORMAT, a SNAPSHOT SAVE for saving the entire memory, including games and SNAPSHOT RUN for subsequent running.

With the exception of EXTREE which is replaced by CATALOGUE, the DFS utilities are the same as ADFS.

Using the tape to disc feature, games can saved to disc by interrupting them while running with disc control software programmed into Click. Also included are screen dump and click editor options.

The retail price of Click will be £69.95 but there is a special introductory offer of £59.95.

Slogger's new product under development is an Electron version of Stop Press which will need a Master ram board and will go inside the Electron using one of its memory pages.

Slogger can now be contacted on 0736 78727 and their products are available from Broadstreet Computer Centre, Four Hazels, Allard Way, Broxbourne, Herts. Ring 0992 464248.

PRES

Tel: 0276 72046
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IN THE FOREFRONT OF A3000 UPGRADES

DEALER ENQUIRIES WELCOME

"PRES's range of add-ons offers tremendous advantages. The system can grow with your pocket, it offers security and strength but most importantly it offers choice." (AU Feb.90)

The starting point is the monitor plinth, probably (we feel definitely) the best on the market @ only £24.95 (plus VAT), from there ... System Housing, Hard Disc Upgrade, Additional 3½" Disc Drive, Additional 5¼" Disc Drive, Podule Case, Dedicated A3000 Disc Buffer, 1770 DFS for BBC Emulator & DFS Filer for Desktop, plus more to come! (the last three products can be added independently of the other items)

**Contact your local dealer or call PRES direct on 0276 72046 for advice on upgrading your A3000.
We have built our reputation on honest dealing on quality products with thousands of satisfied customers.**

ARCHIMEDES *A3000* PRODUCTS

Monitor stand (A3K1) – Probably the best monitor plinth available for the A3000 and the basis of a modular system.......£24.95

System housing (A3K2) – When you are ready to expand the A3000 this system housing is added, allowing up to 2 floppy drives and a hard drive to be added. £69.50

Expansion card case (A3K3) – If you are adding an expansion card ("podule") to an A3000, such as a hard disc card, then you will need this podule case to connect & protect the card.......£14.95

Disc buffer (A3K6) – If an extra drive/s is to be connected then you will require a disc buffer. This one supports up to 3 additional drives and incorporates software control for physical to logical drive mapping and 40/80 stepping which could prove essential when using discs in 65 Host or PC emulator. A key feature is the built in expansion for further cards to be added internally; also see A3K12. *NB: Some cheaper products may only provide connection for an additional drive without buffering*.......£48.95

20Mb hard disc (A3K7) – A 20Mb hard disc drive ready to fit in A3K2, including the hard disc card and all cabling. We are not aware of any other hard disc upgrade that is treated as an internal upgrade (consult your Acorn dealer or call PRES for details).....£399.50

NEW 40Mb hard disc (A3K14) – As A3K7 but twice the capacity.......£499

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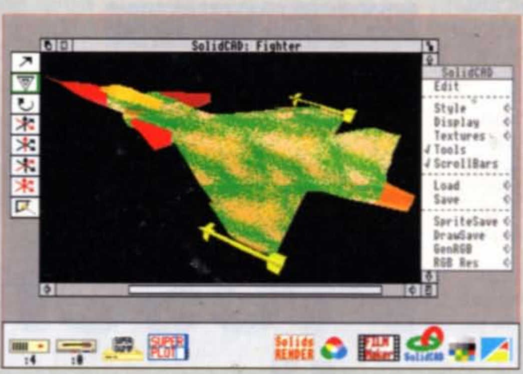


SILICON Vision (081-861 2173) have released upgraded versions of a number of their products for Archimedes and BBC A3000 machines.

The SolidTOOLS 4.0 upgrade sports many new features for improved presentation and productivity.

A high-speed texture mapping facility for surface finishes is now included in SolidCAD 4.0, FilmMaker 4.0 and Realtime Solids Modeller 4.0.

This allows instant realism to be added to designs in the form of surface textures which include teak, oak and mahogany wood effects plus marble, brick and tile stone effects. Texture sprites can be scanned or painted in a 256 colour Art package for importing into SolidTOOLS.

A full screen texture mapped image can be generated in less than two seconds, even for complex scenes.

For even better image quality, SolidCAD 4.0 and FilmMaker 4.0 have also been extended to create 24 bit RGB data in addition to the standard 8 bit colour format.

Now SolidCAD 4.0 also supports !Draw files for greater integration with 2D technical draughting packages, and a new release of SolidsRENDER 2.0 has been produced with enhanced image quality using colour diffusion algorithms.

Rounding off the upgrades is RiscBASIC Release 2.06. All registered users with V2.05 or earlier can receive a free upgrade to the compiler by returning their discs.

The SolidTOOLS 4.0 upgrade costs £125 and SolidsRENDER 2.0 is priced at £70. Realtime Solids Modeller 4.0 and SolidCAD 4.0 each cost £50 for existing owners of version 3.0 and 100 for owners of version 2.0 or earlier.

The FilmMaker upgrade costs £20 for existing owners of version 3.0 and £30 for owners of version 2.0 or earlier. Upgrading RoboLOGO costs £35 and RiscBASIC, £50. Original discs must be returned.

The complete works...

AN unusual new program called !Works from Jim Markland (4 Shalford Close, Cirecester, Gloucester GL7 1WG) is now available for the Archimedes. !Works is actually a suite of programming tools: Tools#1 costing £10, Tools#2 £30 and Tools#3 is still being worked on.

!Works Tools #1 enables you to output DXF (Data Interchange format) files compatible with !Draw.

This format is used by several popular vector graphics packaging such as !Draw, AutoSketch, Euclid, LinCAD, WorraCAD and PDT. You can merge these files and port them to and from other machines.

If all this seems a little too technical, don't worry. The DXF file format is explained fully within the program with lots of examples, Basic DXF Library Procs and model programs.

In !Works Tools #2 there's a utility called !Contour. This is an extemely versatile application for surface modelling and is of particular use to geographers, geologists, archaelogists, mathematicians, scientists and engineers.

As you move contour lines, others are automatically added. You can use your surfaces in a variety of other programs as illustrations by saving them as Sprite or DXF files. Or you could use them in a ray tracing or wire frame context by saving them as MTV polygons or in Euclid format.

Leaning Curve going places

ACORN are expanding their Learning Curve Promotion into an advertising campaign in the London region. Launched last March the complete package was proved to be a winner when a recent report confirmed the BBC A3000 is the top selling school computer.

The report went on to say that sales to parents is a growing phenomenon since the requirement of the National Curriculum to exploit information technology for all ages.

Celebrating the production of the 100,000th Risc-based machine, Acorn have made a special donation to the Special Needs department of the West Bridgford school in Nottingham.

The school was selected because of the initiative shown in obtaining support for its special needs group.

The four teachers work with pupils with specific learning difficulties such as reading, or physical difficulties including partial sight and hearing impairment.

Acorn's Roger Broadie said: "West Bridgford provides a fine example of what is happening in many schools nationwide to ensure those with special needs can partake fully in the same quality of education ... available to all." The school can now enjoy its A3000, which comes with Artisan, Pendown, Impression Junior and !Help.

Glass guards against spies

READERS may remember our previous story on data spies who can lurk outside unsuspecting computer installations, home in with powerful equipment and pick up sensitive information from electronic signals which pass through windows.

Now Pilkington Glass have come up with a weapon to thwart intruders. Called Datastop, it's a spy proof glass with special coatings to reflect electromagnetic radiation. It does away with the need for computers to be housed in a Faraday cage or for windows to be fitted with diffusing wire mesh.

Not only does Datastop prevent malicious intrusion, it also cuts out the corruption of computer data by electromagnetic radiation such as radar entering from outside the building.

The Ministry of Defence, Foreign Office and City institutions are already showing interest in Datastop following tests at the Building Research Establishment.

An office was fitted with the special glass and tests carried out by both the Electrical Research Association and Communications Audit. The office was found to be secure even with an aerial sited immediately outside the window.

Presents all round...

HAPPY birthday to me, happy birthday to me, happy birthday dear Hac-Man, happy birthday to me. Yes, this column is four years old, so welcome to the festivities.

This month's offering will be of particular interest to Archimedes owners, but judging from the contents of my latest mailbag, I think the column inches devoted to a bit of breaking and entering will be well appreciated by many BBC Micro owners.

I should also give a belated welcome to Electron owners. I'll be supporting that machine just as I have the BBC B, B+, Master, Compact and Archimedes, so get those letters coming.

Incidentally, in the days when Martin Reed, my one-time opposite number, was running the Electron User Arcade Corner, there were a number of program contributions from one David Donaldson.

Well, ladies and gentlemen, I am that David Donaldson at your service – but that's not my real name either...

Anyway, enough of the starter – on with the main course.

Power pills

- Thundermonk passwords
- Archimedes Repton 3 Life of Repton passwords
- Hostages window-assault hints
- BBC Micro Hostages level passwords
- Archimedes Hostages level jump

Clerical thunder

Matthew Blythe of Clifton, near Bristol, has written to me about Minerva's arcade-adventure **Thundermonk**. He says that he managed to complete the first two screens, for which he was given two passwords: STEVES and MAJORCA.

However, when he came back to the game a couple of weeks later, it would no longer accept the passwords.

Undaunted, he played through them again, and found that they had changed to HOLIDAYS and FAILED. Matthew adds that the password for screen A – previously STEVES and HOLIDAYS – has since changed to RESULTS.

I phoned Minerva, who confirmed that the passwords for Thundermonk change on the first of every month. The code for Thundermonk contains a table of 36 passwords – 12 for each of the second, third and fourth levels.

When loading, the game checks the system date and selects one set of passwords from the table, based on the current month of the year.

Although I gather from the tone of Matthew's letter that he would much rather the passwords remain constant, the programmers had a very good reason for designing this ingenious system. Apparently a certain other magazine published the passwords for one of their previous offerings a scant couple of months after its release.

Minerva felt very strongly that this may have spoilt the enjoyment of a number of players by providing an easy way out before they had really been forced to work their way in.

Since the very early days of the BBC Micro it has been the policy of software authors – games and otherwise – to make the most of whatever memory and hardware is commonly available. One example that springs readily to mind is that of the Master Series machines.

Although many utility programs, such as the Inter-Word word processor that I use, have been designed or extended to take advantage of popular but non-standard memory expansions such as third-party sideways and shadow ram boards, almost all games were designed to work with the unexpanded Model B.

However, as soon as the Master was produced games written to take advantage of its resources started to appear. Although the gameplay of Stryker's Run is, to my mind, nothing really special, it was the first to offer an enhanced 128k version, and the impact it made on its release in September 1986 has stood it in good stead ever since.

Indeed, it was this philosophy of using every available bit, byte and bob that led to the swift demise of the original BBC Model A in the face of the 32k Model B.

The idea of Thundermonk's changing passwords system was that by the time a column containing the passwords had been published in a magazine, the passwords would have changed.

Although I like the idea, I think that once a level has been completed, any of the passwords for it should allow access to that level in the future. However, this does not solve the problem of the passwords being leaked too soon.

As all Archimedes games are published on disc and don't need to disable the filing system, one idea would be to allocate some bytes on the disc to reflect the status of each level, in the same way that many games save the high-score table directly on to the game disc.

When the player has completed a level he should be given the option to update the status byte so that this level can be skipped in future games, perhaps by entering a password.

However, if he chooses not to update the disc, thereby preserving it in its original state, he will have to play through that level the next time he plays in order to access the following level. Another alternative would be to let the player decide what the password should be. It's something to think about.

Getting back to the game of the moment, the full set of passwords for Thundermonk is as follows:

Month	Level 2	Level 3	Level 4
January	SHIRT	JUMPER	WELLIES
February	LOVERS	HEARTS	CUPID
March	DANIEL	AND	SIMONS
April	JOKES	SHOWERS	FOOL
May	POLE	EXAMS	SUNNY
June	STEVES	BIRTHDAY	MIDSUMMER
July	HOLIDAYS	MAJORCA	SUNHAT
August	RESULTS	FAILED	PASSED
September	SCORCHER	RESTART	SUNBURN
October	SPOOK	SHIVER	HALLOWEEN
November	BONFIRE	WEEEEEE	FIREWORKS
December	CHRISTMAS	HOLLY	PRESENTS

Thundermonk monthly passwords

From this list it would appear that each time Matthew completed level 2 he did so in the month after the one in which he completed level 1. How strange...

Pat Cleaver of Minerva has informed me of a useful point that I am sure will be invaluable to fans of Thundermonk, namely that in certain locations you can walk or shoot through the walls. This is a very important aspect of the game –in fact it cannot be completed without discovering this feature.

Back to the Green Lizard

Regular readers will have noticed that over the last couple of months I have been featuring the passwords and edit codes for the individual components of **Archimedes Repton 3**. This month it is the turn of BABY, SCHOOL, TEENAGE, WORK and OAP – better known to BBC Micro and Electron owners as The Life of Repton.

The full set of passwords for these 40 screens, courtesy of my tame Repton addict, Cleone Patterson of Amersham, goes like this:

As explained in previous columns, these passwords and edit codes are not compatible with the screens of the BBC/Electron versions of Life of Repton. However, if any owner of these 8-bit versions needs help, look no further than our August 1988 issue.

Level	Baby	Edit Codes	School	Edit Codes	Teens	Edit Codes
A	BABY	52051	SCHOOL	62156	TEENAGE	67063
B	STARTLE	66766	QUALIFY	66230	ETERNAL	57784
C	MEASLES	65943	KNICKER	55703	WHISPER	45550
D	GRANITE	52891	DYNAMIC	56778	FEATHER	37236
E	WHIMPER	58018	TENDRIL	41690	RHUBARB	43386
F	CUSHION	49351	LANYARD	66269	JASMINE	42276
G	ALIMONY	53421	VINEGAR	60671	KNUCKLE	52421
H	UTENSIL	46357	YASHMAK	69808	IMAGINE	58010

Level	Work	Edit Codes	OAP	Edit Codes
A	WORK	62193	OAP	62963
B	INVERSE	50848	JACKDAW	56272
C	PARAPET	59712	RUPTURE	63244
D	ELEGANT	68281	ARCHERY	59961
E	SCRATCH	54392	FIGMENT	45854
F	COUNTER	55251	NATURAL	64632
G	GARMENT	54898	TONIGHT	64804
H	WALKOUT	54326	BRIGADE	92836

The Life of Repton passwords

Baby

Work

School

Teenage

OAP

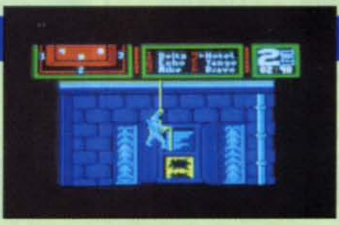
Hostage crisis

I was recently talking to Steve Hanson of Superior Software about life, the universe and everything, and he mentioned that he has received a number of phone calls from players of **Hostages**, who, almost universally are having problems getting through the window on the second level.

Although this is difficult at first, I can assure everyone that it can be done – it just takes a while. However, once you've got the hang of it, you can normally do it every time.

You should start your assault from a position roughly three times your height above the window, then press the Swing-out key. You will hear a series of tones of increasing pitch.

Release the key when you hear the highest tone in the scale, which indicates that your swing will be greatest at this point. As you release Swing-out you should also press Down to swing down to and through the window.



BBC/ Electron: Abseil HOTEL positioned correctly before swinging out and entering upper window

To complicate matters, you should also press the Hold key as you approach the window because if you have misjudged your swing and fail to get through the window you will fall off the rope to your death.

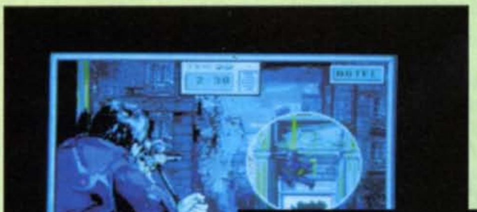
Steve notes that it is much easier to get inside the embassy by this route if in Level 1 you positioned your three men from Level 1 at each of the three windows.

This is because they now act as snipers and can be used to shoot out the windows through which you are trying to enter the embassy. Now why does that remind me of The Hobbit? BREAK WINDOW, SAY GANDALF "CARRY ME", GO WEST...

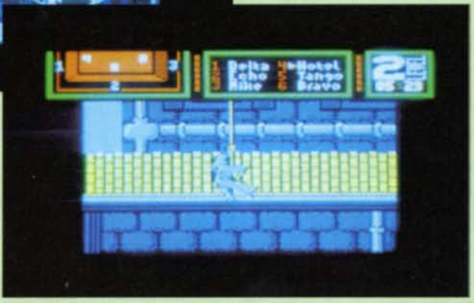
Another point to note is that the embassy consists of two floors, and your choice to storm either the upper or lower

➤

➤



BBC/Electron: Windows should be shot out by the snipers before attempting to enter



A3000/Archimedes: Abseil positioned correctly before swinging out and entering a window

window with each man is the factor that determines on which level that man starts. This may be obvious when you think about it, but not so when you are actually playing the game.

Steve recommends that although both hostages and terrorists are randomly scattered throughout the embassy, you should try to get two men on to the upper floor and one on the lower floor.

As all would-be heroes and heroines know, Hostages features three missions of increasing difficulty, and only when you complete one mission are you given the password to the next.

The passwords for the three missions on the BBC/Electron game are: DEADEASY, PENULTIM and MAXITUFF.

Scott Swinton, James Marshall and David Horner have sent me another tip that I am sure will be invaluable to all Archimedes players of Hostages, particularly those who have been experiencing trouble with the window.

To activate it, hold down the R, U, T and H keys when the letters that make up the word "HOSTAGES" fall down the screen. You can now select the level on which you wish to start.

The reason for this choice of letters is quite straightforward: The Archimedes version of Hostages was written by one-time BBC Micro/Electron stalwart Gary Partis, who is married to a charming young lady by the name of Ruth. And who's heard of a Gary Partis game that doesn't feature a cheat mod.

● *Well, that's about it for this month. Many thanks to everyone who has helped make this column what it is – Pete, Steve and Pam who wield the red pen behind the scenes, Walt Patterson for all the idiot-proofing in the early days and to all of you, the readers, whose constant contributions, suggestions, hints and requests have given me so much enjoyment over the past four years. Let's hear it for the next four. See you next month.*

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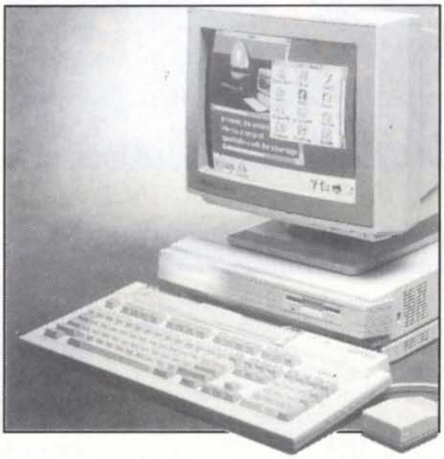

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... a pink ball, Dave

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MASTER BREAK
ACORNSOFT

The title screen

MASTER BREAK
ACORNSOFT

Waiting to start

SELECT PLAYERS
steve
Pam
Pete

Up to four players allowed

SELECT PLAYERS

Nice volume control

There goes the white ball...

Based on the Radio One DLT quiz ,this is the way to really astound your friends with your general knowledge. A mix between Trivial Pursuit and snooker, it's quite surprisingly addictive.

You can play with up to three other people and answer questions from a choice of six categories: Science, Pop Music, Geography, Leisure, the Arts and History.

The first question is chosen randomly by the micro from the list – a red ball question – and you must choose the right answer from a choice of four. You can either press the appropriate number key or, more intuitively and much quicker, click the answer with the mouse.

You pick the subject for all future questions. All are of comparable difficulty, but the varying time you are allowed to answer them in can pose problems. The black ball questions score highest because you have only about two seconds to answer. You'll need very quick reactions to get the maximum break of 147.

You may decide to pass on your go, but you can only do this three times – also you must decide to pass before the question put to you. Sometimes you get a message stating that the ball is over the pocket. If you fail to answer the question it's a foul and your opponents get the points – nasty.

The digitised pictures and sounds on the Archimedes version are very nice indeed. The timer really adds to the atmosphere – I panicked the first time I tried to answer a black question. The colour and type of questions change round each time and some of the questions are very difficult indeed to answer in the time allowed.

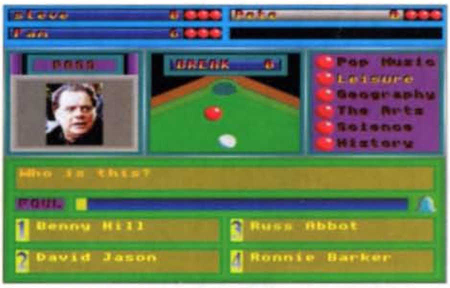
If you get it wrong you are not told the right answer. I realise this is so that you don't become familiar with the answers, but I'd have preferred to know – especially when I'm sure I'm right.

On the Archimedes version the excellent graphics mean that you can have picture questions that very well, and there are sound questions although I'm not impressed by some of the music – excruciating in places.

That apart, it's good to play on your own or with friends.

Pam Turnbull

Graphics	10
Sound	8
Playability	10
Value for money	9
Overall	9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FOUL

Who is this?

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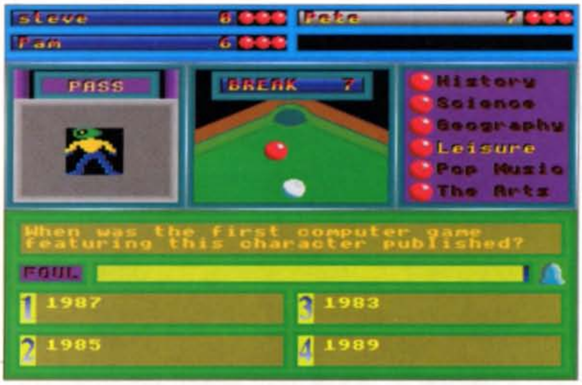
3 Russ Abbot
2 David Jason
4 Ronnie Barker

Recognise this fool?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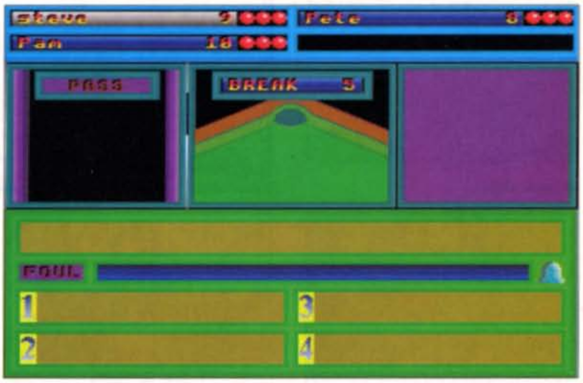
The Arts
FOUL

When was the first computer game featuring this character published?

1 1987
3 1983
2 1985
4 1989

That lizard again!


steve
9
Pete
8
Pam
18
PASS
BREAK 5
FOUL
1
3
2
4

Bring on the next player

POWERBAND

Price: £24.95
Supplier: The Fourth Dimension, Dept. 4444, 1 Percy Street, Sheffield.
Tel: 0742 70061

WELL, it's arrived, the Formula 1 version of Gordon Key's great E-Type race game. Perhaps that's a bit unfair, because Power band is completely new.

I have it on good authority that it started out as an experiment to see just how fast 3D solid graphics could be on an Archimedes. So a 16 colour screen mode was chosen to reduce the number of bytes needed for plotting for each screen.

It was because this method is so blindingly fast, resulting in so much free time for calculations between each frame, that Powerband has become as complex as it is. And it is still very, very fast.

What you get for your money is a video-style box with two discs and a manual – the usual from 4th Dimension.

Booting up disc one produces a nice title screen followed by a digitised (but doctored) picture of a racing car accompanied by a quick burst of The Chain by Fleetwood Mac followed by cars racing round a circuit.

Teeny-weeny niggle here: You can't bypass this sequence to get on with the game.

Having inserted disc two, the tracks data is loaded up and you get to the menu screen. The centre of the screen contains a vector graphic of a formula one racing car moving round like the spaceships at the start of Elite – except that the car doesn't turn upside down.

Here you can select the type of game you want to play, alter the track and change the parameters of your car. The race modes are Fun, Practice and Championship.

In Fun mode your car can survive any amount of damage and you can also drive backwards down the track. Also when you enter the garage certain special options are available: A super-powered engine and super-sticky tyres.

Practice mode allows you to race properly, but before each one you go round the track to get a lap time which affects your starting position on the grid. Each track has its own fastest-time records and if you make it your name will be added to the list.

When playing in a Championship you are presented with a new sub-menu page with just the garage and race options from the original screen available, but with the addition of load, save and quit icons.

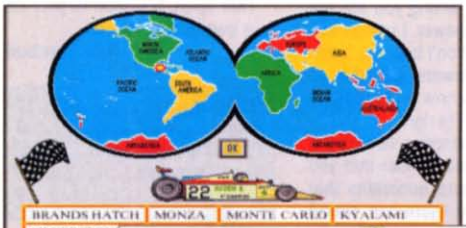
Although you can save your position after a race, the saved file is deleted after you do a load to restart. This means you can't keep trying the same race until you get the result you want – you have to play the Championship straight through from start to finish.

After the qualifying lap for position on the grid comes the first race – there are 10 on circuits chosen at random from the 16 available.

As you prepare for each new race you're given a brief rundown and map of the circuit you're about to tackle.

The other main options on the menu screen are the Airport and the Garage. The former is used to change your track selection: Some tracks are easier than others, for example Hockenheim in Germany has long straights and few tight corners, whereas Suzuka in Japan has lots of alternating turns and is a real pain. At Monte Carlo and Detroit there are tunnels too, which are exciting.

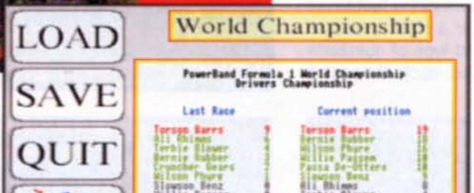
The garage lets you alter six aspects of your car's performance. There are seven types of gearbox, including an automatic for beginners, three engine tuning levels, three types of tyre, front and rear aerofoils, and steering



Changing circuits

POWERBAND
World Champion
Sponsored
The Fou

The ultimate goal



World Championship

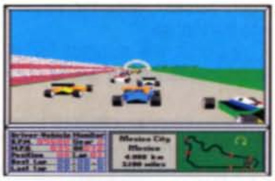
```
PowerBand Formula 1 World Championship
         Drivers Championship

   Last Race                  Current position

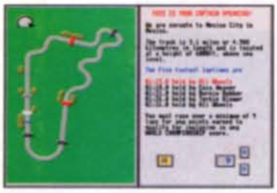
Torson Barrs       9      Torson Barrs       19
Ali Bhimms         6      Bernie Bubber
Terbie Blower      4      Wilson Phyre
Bernie Bubber      3      Willie Passem
Croncher Gears     2      Passa De-Otters
Wilson Phyre       1      Slowson Benz
Slowson Benz       0      Ali Bhimms
Willie Passem      0      Terbie Blower
Passa De-Otters    0      Getno Blakes
Ezza Weaver        0
Getno Blakes       0
GORDON J KEY       0

              Four races
         The next race is a
```

Going for gold

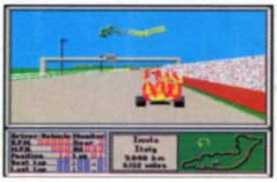


Up with the pack

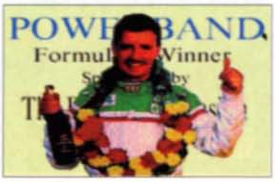


An easy circuit

POWERBAND
22
Acorn



Burn out!



Race winner

ratio.

It's vital to understand that these really do affect the way the car behaves, and you should alter them to conform to your style of driving and the type of race. The steering ratio option actually alters the relationship between mouse and car movement.

The review game was Powerband version 2, which has a number of extra options – mainly the chance to alter the other drivers' skill levels. The other drivers really do race, competing against each other and you, but drive within the preset limits of their skill.

Game play is fast. Fairly easy, though you do need to adjust the steering ratio carefully for your mouse. It's definitely worthwhile using timed mode to get the hang of driving first. It's so easy to spin off by too sudden a mouse movement or changing down a gear at the wrong moment.

Racing against the other cars is awful – I've so far managed to finish in seventh place on one of the easy tracks after getting fifth position on the starting grid due to a record lap time.

Cornering when you're surrounded by other cars is unbelievably nerve-wracking. I don't think I'll take up Formula One racing as a profession.

The graphics are excellent, but the sound could be a problem. The digitised engine effect is a persistent whine – just like the real thing.

You can turn the volume down, but you have to be able to hear enough in order to know when your car is revving at the right speed for gear changes. You certainly haven't time to look at the instruments.

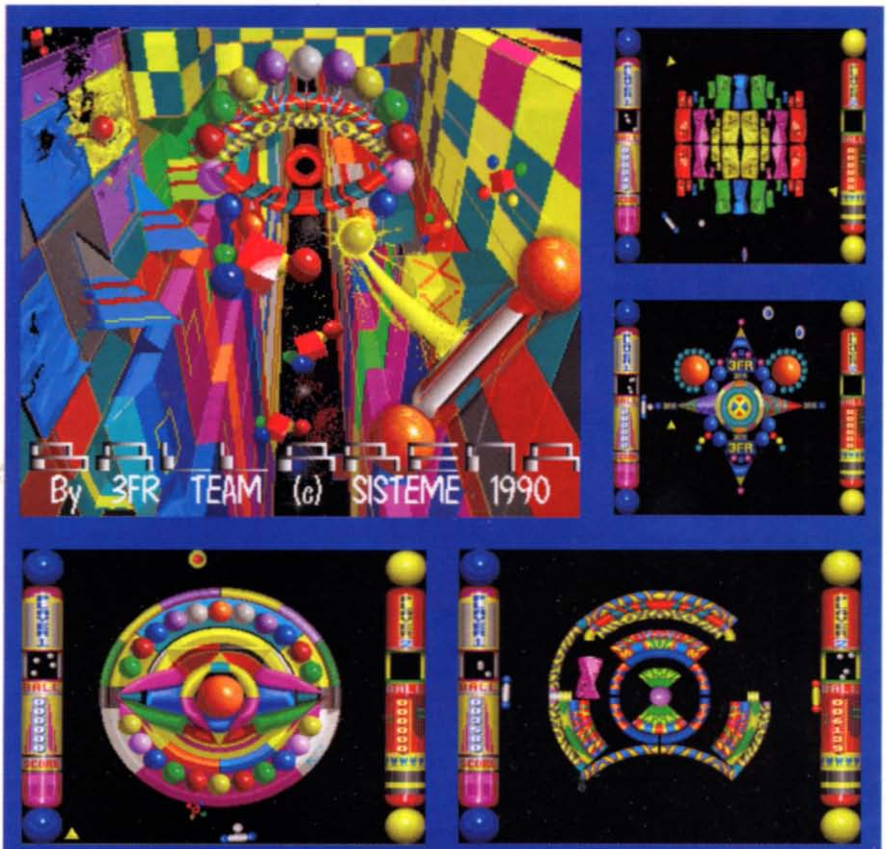
You can hear the other cars too, complete with doppler effect as they scream past you.

I was a bit miffed that all the tracks are flat – I happen to know that Brands Hatch has a vicious dip on the turn at the end of the first straight – and I'd have preferred a first person view like Revs rather than looking at the car from behind.

Niggles aside this is another outstanding piece of programming by the amazing Gordon Key and I am hooked.

Steve Turnbull

Graphics	9
Sound	8
Playability	8
Value for money	10
Overall	9



The stunning graphics of Ballarena

BALLARENA

Price: £19.95
Supplier: Sisteme, BP3, 4 rue de Massacan, 34740 Z.I. Vendargues, France.
Requirements: Archimedes or BBC A3000

WILL Breakout clones ever cease to appear? No, probably not, and to be honest this can hardly be called a clone – mutant is probably more accurate.

The scenario is the usual one. There are a set of bricks and you have a bat and ball. You propel the ball towards the bricks and when it hits one it vanishes and bounces back at an obscure angle. You then have to intercept the ball and send it back again. So far so good. But in this case the bricks are all in the middle of the screen and your bat can go all the way round in a circle, the ball can fly straight through the pack of bricks and come hurtling out the other side – or at any other angle – and you have to be there to get it.

Like most newer break-outs (or perhaps, break-ups in this case) bonus items come spiralling out towards you. A little panel comes up to tell you what each new item does when it first appears.

In the two-player option both bats are on-screen simultaneously but they can't go past each other, instead they push. This makes for some interesting interaction, although you could team up as well.

But what really makes this game are the graphics. Every level consists of stunning creations, and in almost every case the so-called bricks are not particularly brick-shaped – in fact there's almost every other shape except rectangular.

Every fourth level provides a challenge stage where you have to shoot little sprites that spiral from a not-quite-central location – it's all very infuriating.

Ballarena is polished and professional as well as beautifully put together. Sound is used to excellent effect, with loads of digitised snippets that range from fun to aggravating.

All the usual options are available, key definition, mouse/keyboard/joystick use, pause, sound control and a high score table. In fact it's totally brilliant.

Lazarus

Graphics	10
Sound	10
Playability	9
Value for money	10
Overall	9

Arc Pinball

...really wizard

Price: £24.95 (Archimedes) £11.95 (BBC/Master/Electron disc)
Supplier: Shibumi Soft, 3 Parkfield Road, Long Buckby, Northampton, NN6 7QJ.
Tel: 0392 437756

ANYONE who saw the film *Tommy* will recall the sight of Elton John, wearing massive sunglasses and even larger platform boots, singing Pinball Wizard.

Unfortunately for Tommy, he did not have the benefit of the new game from Shibumi Software, ArcPinball, otherwise he may have gone on to even greater heights.

For this is a pinball machine simulator par excellence, having all the features of the real thing, flippers, tilt, springloaded firing pin and coin slot, plus digitised sound and pictures, speech, applause.

It is also loaded with the qualities essential for any computer game ensuring hours of captivation and fun.

The single disc is crammed full of program and the disc drive whirrs away while the game is being played as different graphics and sounds are loaded smoothly into memory for the next stage.

This does not detract from the enjoyment as the gameplay is usually ongoing and the loading process does not cause any delay.

ArcPinball

© 1990 Shibumi Soft

Code and graphics by:
Joaquim Carvalho
Rui Oliveira

Music by:
Jose Carvalho

Getting ready to play, the little monitor needs watching...

After double-clicking on the pinball icon a realistic hourglass appears on screen, the grains of sand smoothly running as the title screen is loaded.

The title is announced both in script and voice, the latter having a slight continental accent – Shibumi is a Portugese company.

The screen is filled with a view of the end panel of the pinball machine – two cash slots, start button, firing pin and Acorn monitor. It's here where you choose your sound, music and picture options as well as being informed of the tilt, fire, flipper keys and so on.

Once you've made your choices, a 20p appears and enters the slot and the machine moves into action.

If you select the no-picture option the background is a navy blue but should you choose a background picture you'll be rewarded with some very nice graphics.

On to game itself. The flippers move extremely realistically without hammering the keys to achieve your object. But the real treat is when you fire the ball.

The mini Acorn monitor in the top right of the screen shows a soccer ball and two legs – digitised, not sprites – and as the ball is fired one leg kicks the football away. Sometimes this picture is followed by a mini car speeding along the road – again an actual picture.

Movement of the ball is so smooth and lifelike that you soon imagine you are playing one of the original machines in a seaside arcade.

The ball bounces around the gadgetry that fills a pinball machine, generating realistic noises as the different barriers, lights and gates are hit.

Each time one is frustratingly lost the Acorn monitor shows a lavatory seat being lifted and the picture disappears down the pan.

If the ball sticks, pressing the Caps Lock and the right Control

TACTIC

...dropped in it

Price: £19.95
Supplier: Eterna, 4, Rue de Massacan, 34740 Z.I. Vendargues, France.
Tel: 010 33 67 70 53 97
Requirements: Archimedes or BBC A3000

WHEN I first saw Tactic my initial thoughts were of Tetris – and, in fact, Tactic is just such another addictive game, containing precisely the right amount of simplicity and ingenuity to keep a player going back again and again.

French software houses are gaining an increasingly high reputation for excellence of graphics and innovative game design and Tactic is no exception.

Eterna say that it is a coin-op conversion but I've not seen the original – perhaps I move in the wrong circles. The power of the Archimedes is exploited in that two players can have a go simultaneously and quite independently.

Different coloured shapes appear at the top of your screen and drop down to the bottom and your job is to arrange them in various ways according to the contract you are given.

In phase one you have to arrange spheres into vertical rows of three all of the same colour – and you have perform the feat four times to fulfil the contract.

Movement of the spheres left or right as they fall is directed by user-definable keys. In addition tone key accelerates the fall – useful when time is getting short. A fire button is used to enter your initials on the high-score table. Other things also turn up at random on the screen, some bonuses and others baleful to say the least if your sphere – or whatever – collides with them.

In this way you can, for example, add four seconds to your time, add a randomly generated line of objects to the bottom (sometimes very useful), increase your score by up to 500 points and so on.

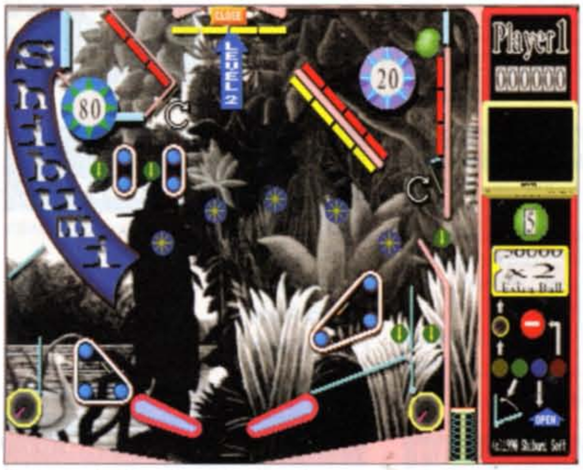
Most useful is the bonus which entitles you to move on to the next phase without completing your contract.

One item renders all objects so far collected invisible for a time – just try remembering what colour is where when you are under pressure and the screen is flashing a *Hurry Up* message. It's about then that I start shouting at my Archimedes.

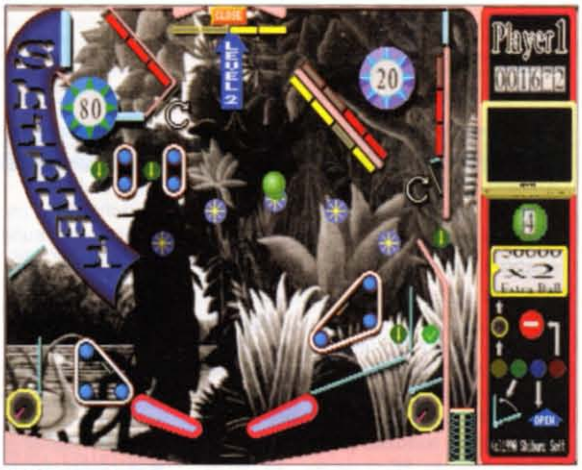
Other nasties take points off your score and reverse the effect of your movement keys for a while.

Phase two is similar, except that you have to arrange things horizontally in groups of three of the same colour – and do it five times. I felt pathetically pleased the first time I achieved this, for it's not as easy as it sounds. Phase three involves blocks of four shapes and diagonal lines of three – harder still.

Phase four is where I am presently stuck. Here you either get coloured squares or spheres,



Don't go up the shoot using the right flipper!



Building a good score takes time

key tilts the machine and eventually frees the ball – a thoughtful addition to this well-programmed masterpiece.

Get stuck at the mouth of the ost ball hole and the monitor shows a picture of a boy waist deep in water seeking help.

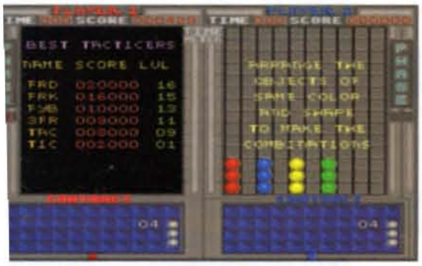
Once your score is reasonably presentable, the top half of the pinball machine becomes available, as the gate to the next level is pened for a short time. Firing the all through it is not too easy, but dds to the atmosphere.

When your last ball is lost the creen changes to a score screen. our final tally clicks up and a siler cup is displayed in the mini corn monitor to the sound of real applause. As higher scores are reached the background picture to the pinball machine changes. But I must confess that I have yet to reach picture two, although my eight-year-old son has got there and is well on the way to picture three.

ArcPinball is a superb game, addictive, well thought out and what others should be aiming for in utilising the power of the ARM chip.

Baz Racon

Sound	*8*
Graphics	*9*
Playability	*10*
Value for money	*9*
Overall	*9*



BEST TACTICERS

NAME	SCORE	LVL
FRD	020000	16
FRK	016000	15
FJB	010000	13
SFR	009000	11
TAC	008000	09
TIC	002000	01

ARRANGE THE
OBJECTS OF
SAME COLOR
AND SHAPE
TO MAKE THE
COMBINATIONS

Two-player game, completely independent

lding with multi-shape blocks

Problems for player two

d pressing the fire button nges one to the other as you ggle to complete the contract. wonder Eterna call Tactic a ne of strategy and reflex.

Mad Hatter

Graphics	9
Sound	8
Playability	9
Value for money	10
Overall	9

Hangman

... Serbo-Croat capers

Price: £12.25 (all versions)
Supplier: Micro-Aid, Kildonan Courtyard,
Barrhill, Girvan, Ayrshire, KA26 0PS.
Tel: 0465 82288

HANGMAN has been around for years, well before the pencil was invented, let alone the micro, so what could be new about this simple word game? The short answer is "Plenty".

Micro-Aid have gone to town on the languages that Hangman can be played in. Not only English but Welsh and Gaelic, Spanish and Chinese, Serbo-Croat and Maltese, Romanian and Czech, not to forget Persian, Latin and Turkish and lots more.

That adds up to some dictionary of words, but there's more to come. Included on the single disc is a compilation file which allows those of linguistic prowess to show off their skills in all the languages provided.

A utility allows you to make up your own file of words in whatever language you choose, as an !Edit file.

Micro-Aid are offering a free copy of the disc to any person or school submitting a new language file to them of 250 pairs of words not in a language already on the disc.

You can translate English to the chosen language or vice versa.The rules of play are simple: As you lose a life the gallows are drawn in simple graphics until the last life is lost and the whole body is left hanging while the Death March is played.

My only criticism of the program is the graphics, which are Mode 7 teletext type and do not do justice to the Archimedes, and the monotone music, for the same reasons, although both are quite acceptable on the BBC Micro version.

This is a good value game-cum-educational tool for both home and school use and at a sensible price.

The lexicon can easily be added to and a school language department would have no trouble in including such in the National Curriculum timetables. Recommended.

Baz Racon

Sound	*6*
Graphics	*6*
Playbility	*8*
Value for money	*9*
Overall	*8*

Dabhand Computing Ltd.

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Midnight Tracer

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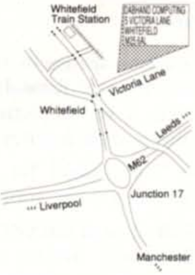

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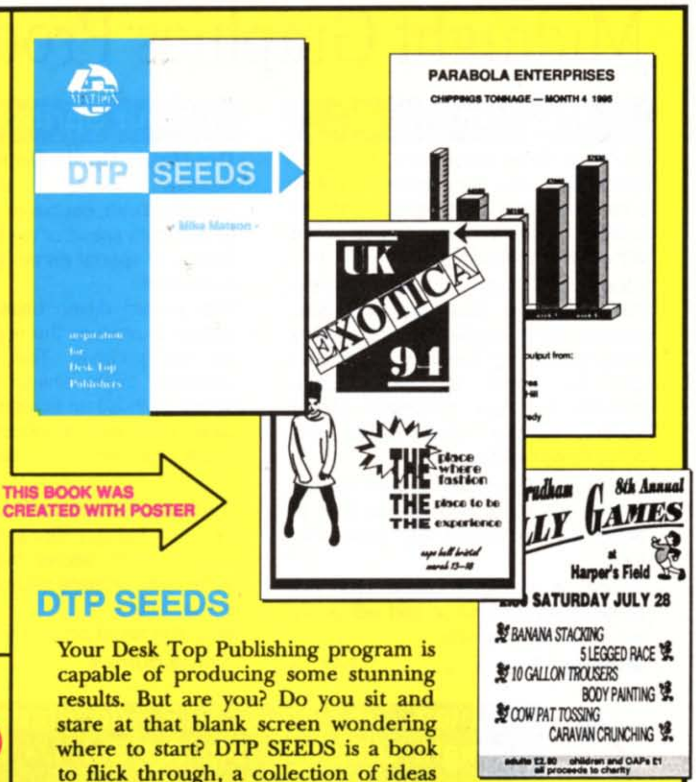
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Penny plain, tuppenny coloured

Nothing beats hands-on experience, so David Williams puts colour printers through their paces

THE Star LC-10 is a very versatile and popular printer – for £125 you get NLQ, three fonts and the ability to do single sheet printing without removing your tractor feed paper. It's also lightweight, and after two years' heavy classroom work, very reliable. But for an extra £35 you can get the colour version.

Now at this price you don't get glossy magazine quality, but at probably the lowest cost available you do get a reasonable representation of colour artwork.

The reds are ruddy – but at least that's better than a dotty shade of grey.

Schoolchildren can be very disappointed with black and white printouts – it's such a poor image after the glowing primary colours on screen.

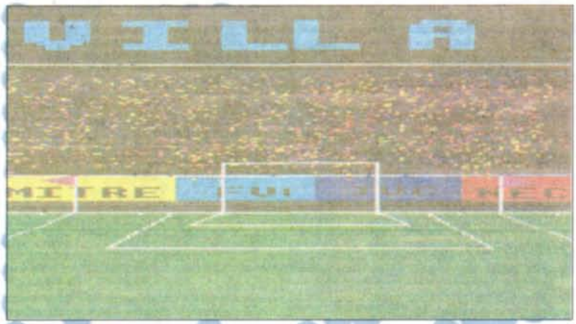
In many cases it's better than nothing. For example a Logo pattern is usually in black and white anyway. But colour often comes out as an unpleasant mess of blending greys and frequently goes straight into the bin.

The principle on which the Colour LC-10 works is quite simple: The ribbon has four colour layers – yellow, magenta, cyan and black, the same ones used in professional colour printing and the ribbon holder can be lifted to present the appropriate colour to the print head. The necessary colours for each line are selected in turn.

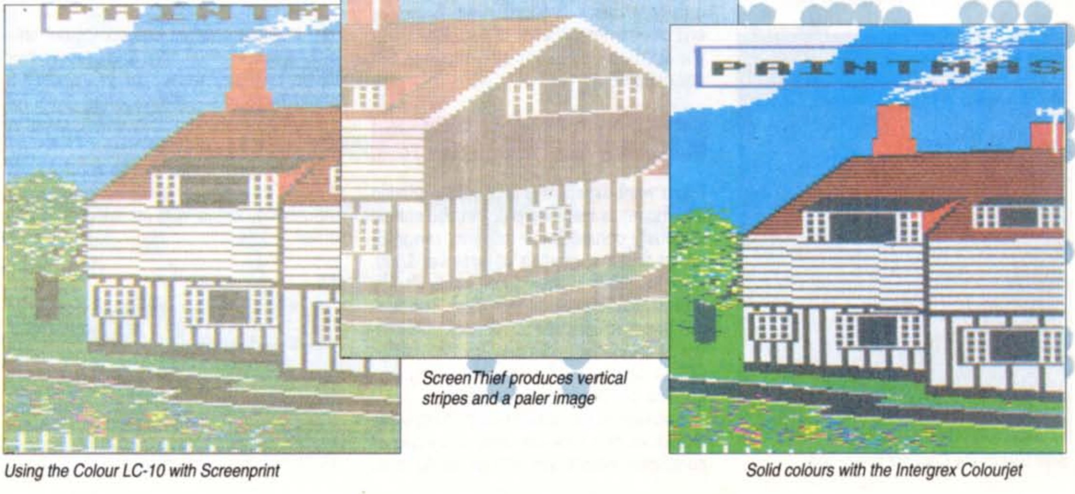
The process is quite time consuming and a full A4 dump can take 15 to 20 minutes – so don't try printing five minutes before the end of a lesson. Also if you're sharing a printer between machines it gets tied up for quite a time.

The resulting pictures never have completely smooth areas of colour, but present a clear stripey effect. This can be used to your advantage and can enhance the image, as in the Villa Park picture. Different types of software produce different effects as seen below, while some pictures are better in black and white. Having said that,

➤



Villa Park benefits from horizontal stripes



ScreenThief produces vertical stripes and a paler image

Using the Colour LC-10 with Screenprint

Solid colours with the Intergrex Colourjet children always seem to prefer to have the images in colour, despite the imperfections.

One useful tip – avoid the use of blue: The printer uses three passes of the head to achieve it and the result can be very murky. Using cyan is preferable wherever possible.

The Colour LC-10 can produce very good images if the background has a lot of mixed colours. This is most likely to occur on pictures from the new Acorn range of machines as the picture of the hawk illustrated.

Drawbacks

Apart from the print quality, one often missed point is the running cost. Ribbons cost £6 to £8 and last for about 10 to 12 pictures, which gives a cost of 50p to 80p per image – and this is one ribbon you won't be re-inking. So only the best work should be printed.

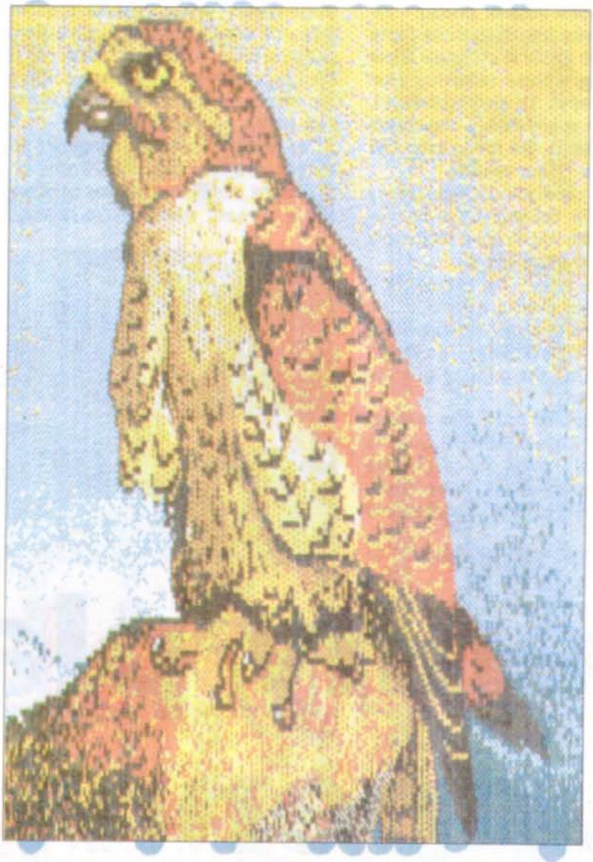
The main factor that controls the number of images available is the type of colours used: Large areas of cyan sky and green grass (cyan plus yellow) will soon exhaust those colours. That other popular colour, red, is composed of magenta and yellow so you can see the problem.

Another point to consider is software. You can't just plug in and go, you have to have a routine that will dump, in colour, to this printer. And there aren't many around.

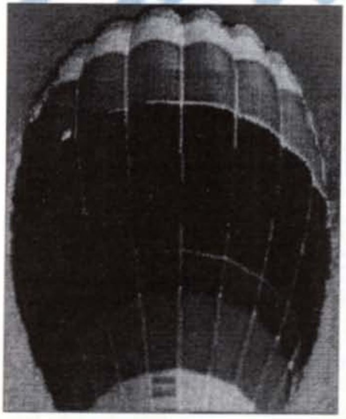
Software

The ScreenPrint rom from ESM is one choice, it's easy to use and comes with a deluxe handbook. Unfortunately, as it's a rom, it can only be used in one machine so is less useful in a school. However it can grab screen images which you might not always be able to get.

Another one, which has snuck in quietly, is ScreenThief from the Northwest SEMERC. This is disc-based and freely copiable for education use, you can probably get it from your IT Advisor. In theory this will also freeze a running program, although it sometimes fails on a BBC B.



The LC-10 can be very effective with quite complex images.



Solid blue on the Colourjet is very dark

The results of the ScreenThief dump are not quite as good as ScreenPrint, the image being stretched and printed sideways. This makes the picture bigger but the colours are paler and the striped effect becomes vertical, which does not look so good. However price and usage advantages may outweigh these problems.

The quality of paper used also significantly affects the finished result. Good quality surfaces produce a much crisper and cleaner image while cheap, loo-quality paper absorbs the ink and mushes the colour borders.

Alternative

If you want excellent quality colour printing and money is less of a problem you should seriously consider the Integrex range of ink-jet printers, starting at just over £500. Here the ink is in liquid form and is literally fired in little droplets at the paper. The special paper used costs £7 per roll and individual colour ink cartridges are £20 each – £11 for black – but they last for a long time and you can buy them separately.

Because of the printing method used the ColourJet can produce wide expanses of completely even colour with no visible joins.

The pictures for this article were reproduced by colour scanning the original printouts using the I-mage scanner from Irlam Instruments. All were scanned at 100dpi resolution except the hawk and the balloon which were grabbed at 200dpi.

Any interference patterns are the result of the scanning process, not the printers examined in the article or the colour dump software used.

The Integrex seemed less competent on a picture with many shades and the pure blue is very dark and dense. The printing time is about the same – although the Colourjet prints one pixel line at a time instead of eight – and it's extremely quiet.

The Integrex printer can be supplied with a Basic program for dumping images and the A3000 comes with an Integrex printer driver.

Summing up

You could buy three Colour LC-10s for the price of one Integrex, but the quality is significantly different. Basically you pays your price and takes your choice.

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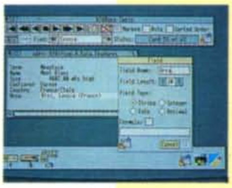

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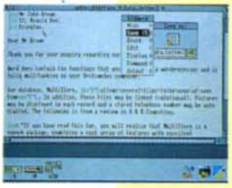
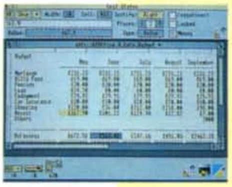
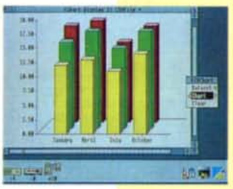
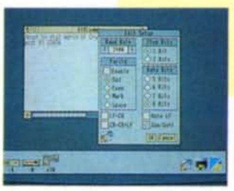


The word - processor, DTOWord is ideal for all types of correspondence, with the ability to change text to bold or condensed, indent, centre, justify etc. DTOWord makes every document look professional. Text can be any colour and even displayed in large characters on screen making this package ideal for young children or those with poor sight.



DTOSheet is fast and powerful but designed for ease of use. Columns can be held for reference and cells locked to prevent accidental deletion. With colours available to highlight negatives or formulae DTOSheet gives all the features you would expect of a high class spreadsheet. Data can be exported directly into DTOChart allowing pie charts, 3D bar charts, etc to be produced in seconds. Sections of pie charts can be highlighted and the colours changed to your requirements.





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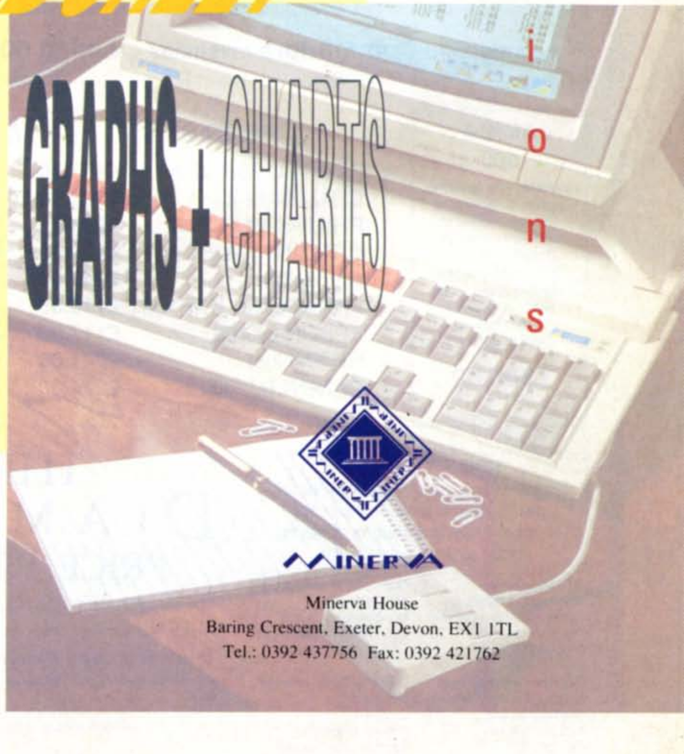

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Success in Sim City

How to become a mayor in a million... games author Peter Scott reveals all

WHEN I first heard of Sim City almost a year ago from generally ecstatic reviews in the computer press little did I realise how well I was going to come to know it.

I'd just finished converting Hostages by Infogrammes when Superior Software, who'd acquired the rights for the BBC Micro version, asked me if I wanted to program Sim City – I agreed immediately.

It arrived a few days later and my first reaction was shock. It is the first game I'd become truly addicted to in years, and after a fortnight of continuous playing I doubted that such complexity and depth could be squeezed into a BBC Micro or Electron.

And when the 2,500k of Amiga source code arrived I realised I was involved in a massive project.

The original Commodore 64 version was written four years ago by Will Wright of Maxis, under the name Metropolis. I decided not to look at this, but to base the BBC Micro one on the Atari ST and Commodore Amiga versions. These were written more recently, are better presented and have many more features than the original.

Put very simply the game makes you mayor of an area of randomly selected land starting in January 1900. You have £20,000 with which to create a city by zoning land, providing power, roads, mass transit, police cover and so on.

Zoning allocates land for residential, commercial or industrial use which are then used in accordance with demand – which constantly changes.

All this costs money which you recoup in the form of local income tax (no poll tax here). If you set the rate too high no one will live in your city, set it too low and you'll run out of money to pay for essential services.

One deliberate departure from "reality" is that in Sim City you can't borrow money – that would be far too easy.

You come across many problems with your city, ranging from traffic congestion to crime, and natural disasters like earthquakes, tornados and alien monsters.

All these factors affect how fast your city will grow or contract, and your score and approval rating. What the people think of you is on a scale of 1000, which is the highest, I've managed 900 in many weeks and months of playtesting. You are given all sorts of statistics to help you along your way:

There's a graph screen that shows a ten year record of six aspects of the city. There's a map which gives you a bird's-eye view of the whole landscape, along with the areas covered by police and fire stations. Inadequate cover can lead to big problems with crime and growth.

It all sounds very simple to play – and it is, using only a few keys and an icon/pointer environment. The addictive hook is that every action you take affects everything in the program but not necessarily straight away.

For example, let's say your people are complaining about traffic congestion, you provide more roads, at great cost. This causes pollution which the people also don't like. It's solving this type of dilemma that makes the game so addictive.

The formulae that connect every factor together are vast and complicated – some are pretty obscure too. For example: Putting up a lot of trees reduces the crime rate. Why? Well, if you look at it putting trees in an area make it look more rural, and so more desirable to live in. This pushes up the property values for the area, and places with a high property value are less likely to harbour criminals so the crime rate is lower.

Knowing these facts helps when playing the game, naturally enough, and yet even knowing how each formula is put together there are inexplicable things that can happen – for example, there's usually a recession at the end of the century. This isn't programmed in but is a result of all the factors that make up the simulation. It's very satisfying to see the program taking on a life of its own, seemingly independent of the programmer.

It took six months of intensive work to convert Sim City twice as long as most conversions take. And

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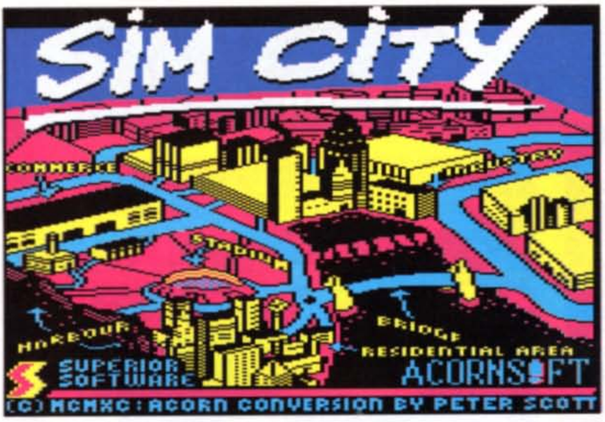

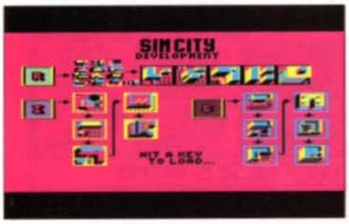

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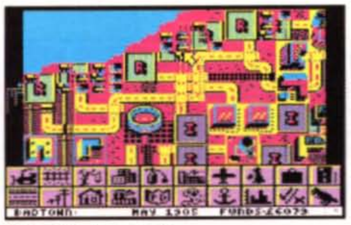
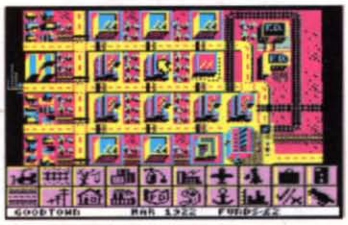


How not to design a city



Organised zoning with plenty of trees

the 25 k memory constraint, above everything else was a constant thorn in my side.

Take working out the power grid: The game has to know how many buildings are and aren't connected to the power stations. The Amiga version uses a 25k buffer to work this out – as much memory as I had in total. The only way I could see to do it was to use the display screen as a buffer and switch all the colours to black in that area using interrupts.

This still wasn't enough and eventually I had to devise a completely original method – the result can often work out the power requirements on an 8 bit Electron faster than the 16 bit Amiga.

The BBC Micro has ended up lacking only the animation of the ST and Amiga versions. This added nothing to the game and could flicker badly on the Amiga so was better omitted anyway. The BBC Micro version has many more features than the original Commodore 64 one yet is half the size.

Because of its nature Sim City is a game of almost infinite complexity, not only is it an addictive game it's also highly educational. Why is it that a four per cent taxation level in Sim City is so successful, yet most real countries start at 20 per cent?

I can only hope that I've been able to give you a true flavour of the theory behind it, and you enjoy playing it.

Hints on gameplay

Playing the game well requires a lot of initial trial and error, so don't be afraid to scrap a city after you realise that you've been doing something wrong and now know how to correct it.

Here are some basic hints that should make things easier:

● Never run out of money

You should always keep enough money in the bank. If necessary, bulldoze roads, rail and power lines to keep your costs down. If you don't the money remaining at the end of the year is split equally between the police, fire and transport services, leaving you to allocate it efficiently.

● Big isn't always beautiful

One of the best aspects of Sim city is that *you* decide what to do. You may want to build a huge sprawling metropolis with the highest population possible, or just a nice, small, profitable town.

● Infrastructure is all

Build lots of mass-transit (rail) links because they are more efficient than roads. But you must have some roads because the police don't use the trains. A ratio of 25 to 40 per cent of road and rail to buildings is about right.

Providing more than one power link to each zone is very wise as an earthquake will cut power lines and your city will suffer as a result.

● Listen to the people

If the people complain too much about something you must take action, the trick is to spot a trend and handle it before it becomes chronic. The graph screen is useful here, but don't worry too much about tax gripes, as long as you are below eight or nine per cent you should be OK. People always complain about taxes!

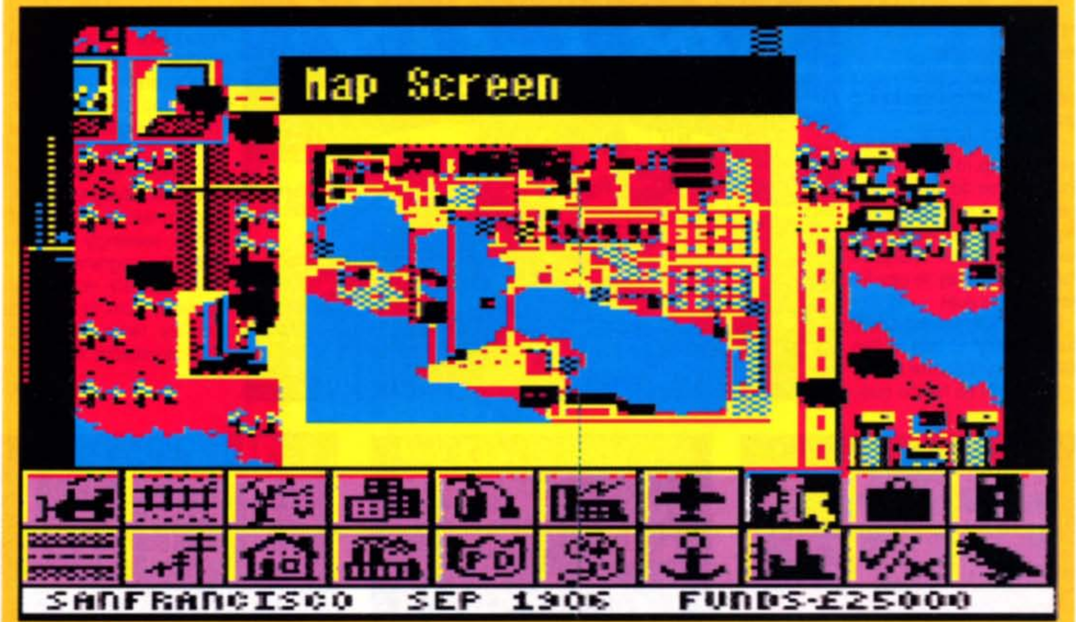
The best advise is to go slowly, nothing fails more dismally than spending all your money building a huge city and then running out of money – remember too that it will take a while for the revenue from taxes to build up to a point where it overtakes annual costs.

Once you're running smoothly provide trees and one or two sports stadiums to make people happy. Airports and docks add to the value of the city.

Crime and fire protection are very important – make sure you've got good coverage otherwise the residents will complain endlessly.

As your city grows there are subtle changes, commerce becomes more popular and the people become more tolerant of higher taxes. In fact, they'll start to leave if the tax rate is too low, this reflects the situation where people move out to live in the country.

Finally, you'll probably find that your big cities score lower than the smaller ones. To handle this you will have to redevelop your inner city areas by bulldozing all your carefully cultivated buildings and starting again.



A big city after an earthquake

PD springs eternal

Teri Paul hops around and discovers some interesting offerings

SO many excellent PD programs have landed on my desk recently that I've been spoilt for choice this month. I've separated out all the useful programmers applications and utilities and will cover them in the April column.

I know that I'm not alone in the disappointment I felt at the Archie's sound capabilities, but not to be suppressed are PEP associates from Chatteris. They have developed the SpeechSystem. Translating text into speech is uses phonemes to build its vocabulary.

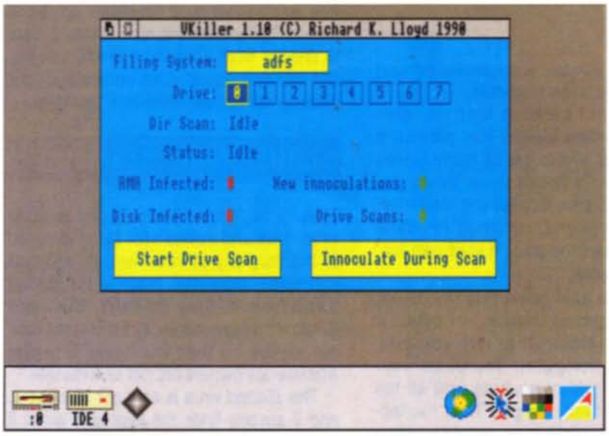
For the non-linguists out there phonemes are the sounds which make up words, so *introduction*, would become the following: *ih / n / t / r / aa / d / ah / k / sh / ax / n.*

Using the built-in sound system you can convert text to speech by using the command *UTTER. You can just type the words you want, but if you enter the phonemes instead you not only get better results, but you'll also find that you can have a huge number of words without taking outrageous amounts of memory.

The system will read text files, speaking the text from the screen – using the hi-fi type play, fastforward and rewind command buttons. The finished system will be a commercial program which you can use for your own programs and other applications – watch the news pages for release dates.

The professional finish of the SpeechSystem is to be expected from a soon-to-be commercial product, but I'm glad to say that the same amount of detail is becoming standard in the majority of PD programs too and !3DGraph is a good example of this.

As you would expect from the title, it's a graph program, but icon-based and very colourful, although windows are not used. The program offers a great deal of information and detail and it is probably one of the best of its kind I've come across. It's shareware as apposed to PD, so if you find it useful you should send the Norwegian authors a donation and they will happily provide you with the latest version.



VKiller 1.10 (C) Richard K. Lloyd 1990

Filing System: adfs

Drive: 0 1 2 3 4 5 6 7

Dir Scan: Idle

Status: Idle

RMA Infected: 0

New innoculations: 0

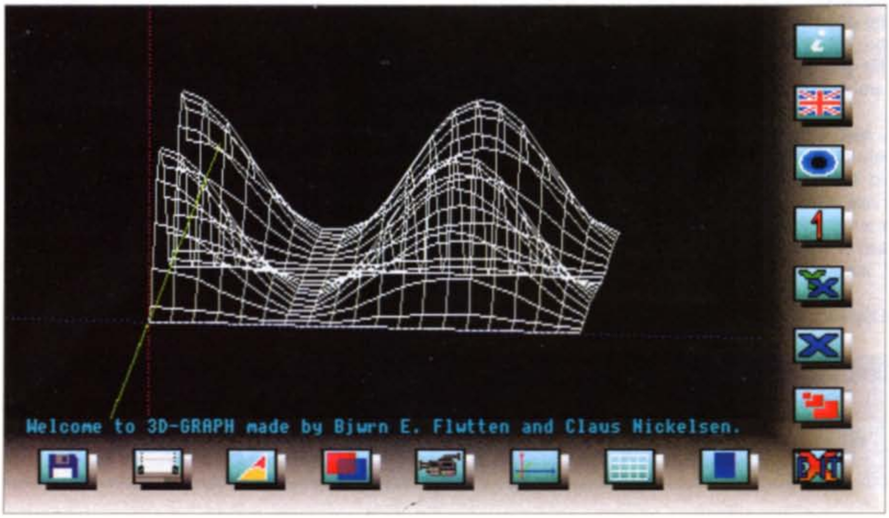
Disk Infected: 0

Drive Scans: 0

Richard Lloyd's Virus Killer

FunTime

Remember Battleships? Usually played on pieces of graph paper, it graduated to a board game and then to computers. This ➤



Welcome to 3D-GRAPH made by Bjwrn E. Flwtten and Claus Mickelsen.

Pretty graphics for 3D graphing

➤

very simple version is multi-tasking and can idle away a few moments.

Another old game is Merrills, also known as 9-Man Morris. You play on a grid and must aim to get as many stones as possible in a line of three. When you have used all your stones, you start moving around the grid, removing the other player's stones and placing your own for maximum points.

Chain is a new game and one which took some getting used to – I think I'd prefer the version that lets you play against the computer. You place your pieces on a grid of squares until all the squares are filled. Simple. Then the tactics begin. By clicking on certain squares you increase the mass of that piece.

Each piece has a critical mass which you must try not to exceed. Centre squares have a mass of four but edge and corner squares only two and three. If you choose wrongly the square explodes, dividing its mass between adjacent squares – you can appreciate how a chain reaction is soon built up and a winning position becomes hopeless.

Archie customising

Apple Mac, and even PC owners with Hewlett Packard's New Wave, tend to point with pride at their trashcan. Jealously guarded in the past by Apple, this icon allows you to dump unwanted files and recover them later if you need to.

There are now a couple of dustbins for the Archimedes, and I for one welcome them. You can dump items in the bin, but if you find a few moments later that you didn't mean to do so, double click the dustbin and your file will still be there.

BackImage comes courtesy of Joris Roeling, a prolific writer of useful applications and utilities in the Netherlands. BackImage has a sprite file happily moving around the desktop. The one I've seen uses the Archimedes logo, but by adding your own sprite to the file you can have whatever you want – we've created a *Micro User* logo.

Tempus fugit, and you need never miss your bus again. A variety of clocks are available which will sit on the icon bar or on the desktop. Daily is one of the latter, while IconClock appears on your icon bar in 12 or 24 hour mode and in three different clockfaces: Raised, lowered or bordered.

Bored of the same old typeface greeting you each morning? Brighten up, here comes Sysfont offering nine different fonts to choose from including HiTech, Courier, Old IBM and Squad. Click on one and your desktop will appear in the new text style.

Little green meanies

I have always been loathe to give room to virus news and stories after being exposed to the stupidity of virus writers on other machines. However, there is no getting away from it, they do exist. BBC and Electron owners are lucky for viruses cannot survive on their machines. However Archimedes owners are not so fortunate.

The *Extend* virus is now out and about, and if anyone finds the idiot who wrote it Scotland Yard's Computer Crime Unit would like to have a chat!

This badly written program infects the !Boot file of any application run by double clicking on the application directory within the desktop. Each time it claims 1k of RMA and eventually the system will crash due to RMA shortage.

It's not as damaging as it could be – especially as it contains a couple of bugs – but there are better and more worthy programming challenges than trying to breed a virus.

My thanks to Hung Computer Associates for sending me !VKiller and to Richard Lloyd for completely disassembling the nuisance and for writing the cure which both removes and innoculates against infection.

Needless to say you'll find !VKiller on this and every month's subscription disc. It is easy and straightforward to use. Pop it on your system disc/hard disc immediately.

Oops!

ARMagedon would like it to be known that they are not a PD library, but PD programmers – sorry guys. Also if anyone has been having problems with the !BarDemo on the February disc it's because you need to add a !Module directory to the root directory, then copy into it the MemAlloc and STracker module by:

```
*DIR $
*CDIR !Modules
```

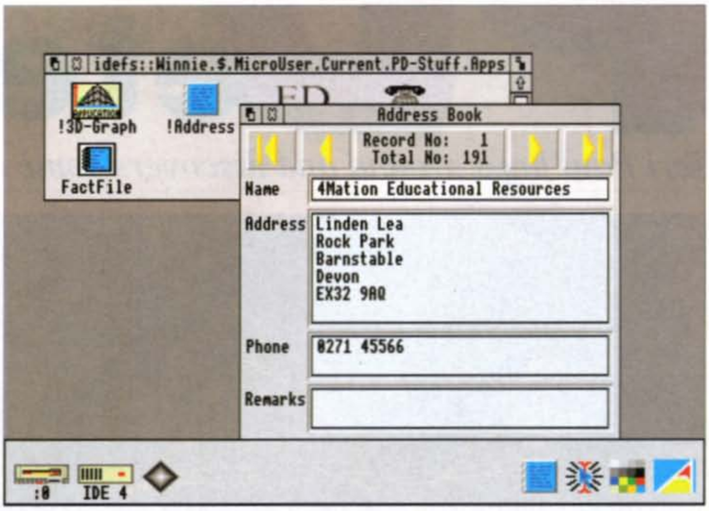
Copy the corresponding modules from the Applications Disc two !Lander and from the monthly disc, then hey presto!

Adam Case from ArchPD is being swamped by eager Archimedes owners, so down on bended knee, he asks for all future inquires to be accompanied by a stamped self addressed envelope.

The monthly disc

You'll find most, if not all of the Archimedes programs mentioned on the subscription disc. All have been virus checked. To squeeze on as much as possible we have archived the programs to fit 1.6Mb in 800k.

If you are not sure how to create a Ram disc and unarchive the files, open the !ReadMe file on the disc and follow the step-by-step instructions.



Record No: 1
Total No: 191

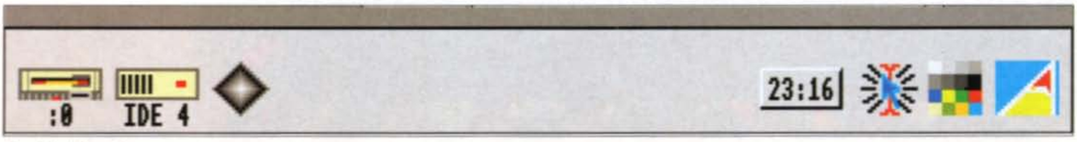
Name 4Mation Educational Resources

Address Linden Lea
Rock Park
Barnstable
Devon
EX32 9AQ

Phone 0271 45566

Remarks

Very nice address file



!iconClock in action

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You'll also find a modern jet fighter a little too large for your tabletop and, unlike Interdictor 2, it requires around 25 groundstaff to get it airborne.

Best to stick with flight simulation, we think. And with that in mind, allow us to introduce Interdictor 2. It is written by the same people who brought you Interdictor but it's bigger, better, smoother and (believe it or not) faster.

It has a more realistic aircraft model, an easy to fly training mode, a new navigation system allowing route planning, way point setting and mission pre-planning. Added to this is LOCSAC a new local Situational Awareness Computer that allows you to monitor the local situation. You'll fly over 10,000 square kilometres of trees, mountains, roads, rivers, railways, lakes and much, much more.

The main scenario contains nine sub scenarios of varying difficulty. There are more types of air and ground vehicles with more weapons. Enemy aircraft have more in-built intelligence and defence, and let's not forget one vital point; they're all out to get you. And there lies the real difference between a genuine jet fighter and Interdictor 2.

If you get shot down, with Interdictor 2, you simply start all over again. And, by the way, Interdictor 2 only costs **£34.95 (inc VAT).**

CLARES

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Archimedes a front runner at BETT '91

Alfred - the robot arm

ACORN machines dominated BETT '91, with Archimedes software now outnumbering that available for the BBC Micro and Master series.

Again hosted at the Barbican Exhibition Centre, the show included a Special Needs Village, Publishing and Software Centres and The Acorn Village.

Many companies use the show to demonstrate or test the water with new programs and concepts. Some may never see the light of day in their present form, but here are some which the caught the public's attention.

4Mation's (0271 45566) New Zealand programmers were in attendance showing off the latest working versions of their new range of Archimedes products.

Activate is a very easy to use animation package which shows the individual frames and the moving model, an ideal way to demonstrate how a combustion engine works, for instance.

Grannie's Bathroom,a multi-tasking adventure still in its early stages, features such heroes as Kylie and Ferdinand the Flea. **Video FX** and **SmArt** promise to be another couple of useful utilities for artists.

Staying on the art front are Clares (0606 48511), with their **Illusionist** package. Due for general release in April, it is an open sesame to the world of 3D ray-tracing and design.

Fitting in neatly with their new titler/sequencer package, it's also compatible with the earlier RenderBender, allowing you to string together a whole presentation.

The titling packing allows you to title videos with outline fonts and so on. It is available in two forms, as a cut-down version will be bundled with a genlock package while the full implementation will be available for around £250.

A new version of **Rhapsody** is on the way, with two new utilites **VoxSample** and **VoxSynth**. The first uses Armadeus samples to create proper voices, while VoxSynth draws on harmonics to produce sounds.

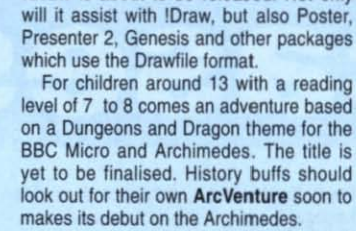
Demonstrating **Viewpoints** were Sherston Software (0666 840433). It is an interactive environment where you can wander around as you would in the real world. You can zoom in to look in greater detail, take photographs of anything you discover and add these to the Viewpoints Database.

If you found **!Help** a vital addition to your Archimedes you'll be glad to find that **!Draw** is about to be released. Not only will it assist with !Draw, but also Poster, Presenter 2, Genesis and other packages which use the Drawfile format.

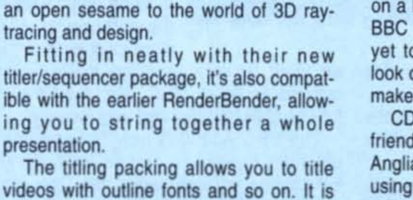
For children around 13 with a reading level of 7 to 8 comes an adventure based on a Dungeons and Dragon theme for the BBC Micro and Archimedes. The title is yet to be finalised. History buffs should look out for their own **ArcVenture** soon to makes its debut on the Archimedes.

CDRoms were popular, with Acorn and friends showing how one is made, while Anglia TV plan to launch a CDRom disc using the Key Plus database. As CDRom prices are starting to drop, this format, especilly if integrated with an on-line system, is looking more and more attractive.

Picture It was launched by Appian Way (091-373 1389) for the Archimedes formats. It enables children to build up scenes using picture icons linked to areas in the National Curriculum. Special Topic Packs cover such areas as History, Geography, Maths, Science, RE as well as Design and Technology.



Pictures from activate and SmArt



Fun and adventure for slow readers

AVP (0291 625439) have combined talents with Somerset LEA to produce a number of off the pegprograms for the Archimedes called **Freedom**. Using Genesis, they are all linked to specific Attainment Targets.

Genesis II from Software Solutions (0954 211760) adds to the original program while not demanding its users to understand the complextities of Risc OS.

Following a more multi-media approach, applications can be produced by combining CDRom, CD audio as well as interactive video and sampled sounds. Real-time digitising can be mixed with text and graphics while sounds are played drectly from the disc so as not to claim large amounts of internal memory.

On the hardware side Unilab (0254 681222) introduced their new extension for the A3000 – **I/O Box 3000**. Plugging into the expansion port it gives access to an analogue and a 1MHz bus common on the BBC and Master.

A third user port has the same configuration as the BBC's printer port, with all the ports being bi-directional.

Teaching the principles of robotics is The Alfred Robot System from HSL (0234 766874). Working on both the BBC and Archimedes, it explores robot arm movement and techniques of computerised control through a friendly program enabling the keyboard to simulate the push-button controls of an industrialrobot.

BBC software was a little thin on the ground, but it was good to see **HiSpell3** from Xavier Educational (0248 351151) available for BBC B, Master and A3000.

A suite of five new programs covers the problem areas of suffixes, soft 'c' and 'g', parts of speech and sentence creation.

Musicians were interested in the Hybrid (0223 420360) demonstration of **SoundSense**. As you move each part of your body the BBC Micro senses it and plays a note for each movement.

Special needs, special cases

George Derby makes the transfer to 32 bit machines

MICROTECHNOLOGY, in the form of BBC Micros, has been used in schools for many years now and for various purposes, such as curriculum access for physically disabled pupils, computer-based learning, simulations, graphical, wordprocessing and database appli-cations.

Unfortunately there is still considerable disparity of both knowledge and use – some schools may have one machine per class or more while many still have only one, and that's in the cupboard.

The level of computer literacy also varies from staff with a detailed knowledge of a lot of software to those with little knowledge and less experience.

While not wishing to paint a picture of doom, the fact is that, despite the hype, there isn't a high level of use or application of this technology.

From its humble beginnings with the BBC Model A in 1982, the hardware technology has developed dramatically to the current Acorn BBC A3000 and Archimedes equipment. The software, too, is far more sophisticated in appearance and function. But the biggest advances have come in the realm of Special Educational Needs.

For instance, before the advent of the Concept Keyboard and its wide support among ordinary educational software, similar input devices were commonly connected to machines being used by SEN pupils.

For many years it has been acknowledged that computers can aid physically disabled pupils in providing mechanisms for independent living using environmental control mechanisms, for communication and in providing access to a previously unavailable curriculum.

The growth and development of software in this field has been voluminous and, from a programmer's point of view, has been technically superb. However, it's not the programmers we are particularly concerned with, though they are integral to the whole process. Current software is much more tailored toward individual need, and any good piece of software will provide a range of options to enable access by pupils with various SEN.

Together with the growth and development of the computer systems has been an equivalent growth in peripheral devices, providing such things as voice input/output, Braille input/output, switch input, expanded keyboard input, touch screen and many others. This allows teachers to interface the machine to the child more easily and effectively.

Unfortunately changes in technology produce their own headaches. Every manufacturer wants to improve their products and Acorn are no exception, but compatibility is a problem. Despite efforts to maintain a coordination of hardware and software there are numerous pitfalls, and teachers are rightfully frustrated when some software that works perfectly on one machine doesn't on a new model.

In some cases it's the programmers not sticking to Acorn's guidelines, but sometimes themselves causing the problem. There's no simple answer.

Acorn have tried to alleviate the situation with emulation programs. But these have their limitations. For example the early version of !65Host – which makes an A3000 behave like a Model B (not the Master) – did not have sound capability and neither could it access a user port.

This means that schools that buy an A3000 won't be able to use most of the software they already own – even if they could get it on to a disc that's the right size. It also needs to be borne in mind that such a copying and conversion job might be an infringement of copyright.

But the BBC A3000 is a powerful machine and has many virtues: The graphics capabilities are superb, the Wimp environment is very friendly, the memory is huge and the software sophistication is extremely high. But do we throw out the old to make a place for the new – like changing cars – or does the existing machinery still have a place in our learning environments?

If a piece of software meets a set of needs – and there are many programs in this category – the equipment to run it should be kept.

This is not to say that the software shouldn't be converted to the A3000 and any improvements made as necessary, but given the difficulties only the very best and most used will get the treatment.

There's a strange argument that states that old software shouldn't be transferred because it won't make full use of the new hardware. This may be true, but if the new hardware is to be fully utilised the most popular software must be provided for it. In any case the majority of software for the old BBC Micro didn't make full use of its potential until very recently.

The BBC A3000 is now filtering into schools, but the transition isn't easy. Educational software aside, the DeskTop environment is easy to use and fine for the physically able – even very young children manage the icon/pointer principle very effectively.

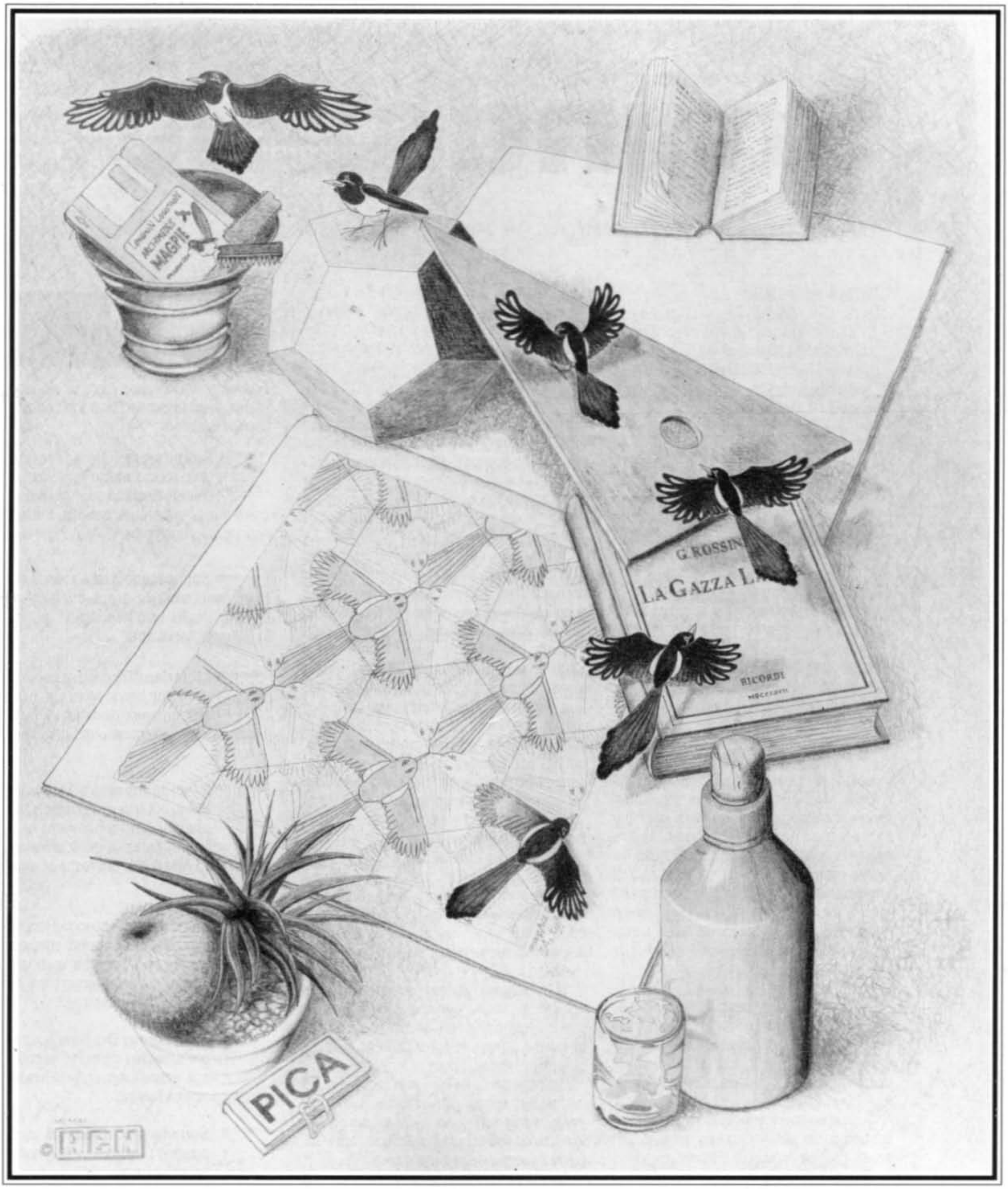
But physical disability can seriously limit fine motor control, and for severely disabled children the Wimp system is quite inappropriate.

Surely more software developers and programmers can put in environmental options to allow access via the keyboard or some other, simpler, input device.

It is still early days for the BBC A3000, and more use can and should be made of the existing hardware. There are many more A3000 developments to be made, but it must be opened up to all children – including those with special needs.

Educationalists must put the needs of the children first, and not just try to keep up with the technological Joneses. Most of those needs can be met with the current range of hardware and software, and it's no use throwing out the baby with the bath water.

George Derby is Headteacher of the Special Education Centre in Wrexham.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Soundspace

Phil Taylor listens in to a very special package

Product: Sound Space 2.0
Price: £29 (Sound Space disc), £128 (Sound Space and Music 5000 Synthesizer Universal
Supplier: Hybrid Technology, 273 The Science park, Cambridge CB4 4WE.
Tel: 0223 420360
Requirements: BBC B and Master, Music 5000 Synth Universal and Microvitec TouchTech 501 or joystick

HYBRID have had a virtual monopoly on the 8 bit BBC Micro music scene for many years with their Music 5000 system. Now they've expanded again with a whole range of new educational products.

The hardware side of this package consists of the Music 5000 synthesiser cable-connecting it to the 1MHz bus and another ribbon plugs into the amplifier on a music centre. You can use the internal speaker, but it's not very successful.

A rom supplied can be plugged in as a cartridge on a Master or attached internally in a BBC B. The synthesiser has been reviewed before and can be used with other software packages like Compose, but its true potential is apparent with Soundspace.

Interestingly no manual is provided, just installation instructions for the rom and an A3 poster showing the screen display's basic features. However, this is not to the detriment of the package and left me pondering the pile of unthumbed manuals on my shelves.

The disc was configured for a touchscreen, but a joystick can also be used. The screen becomes the Soundspace where sounds are created, edited and played. The layout stresses clarity rather than clever graphics, with load and save options at the top of the screen.

Vertical and horizontal walls can be moved around to divide the screen into smaller areas, each can contain a different sound.

The sounds are indicated by four coloured blocks representing shape, loudness and timbre and when selected by touch or joystick a noise is heard through the speakers.

The four coloured blocks are also represented at the bottom of the screen. Select these blocks to change the sound's characteristics and the revised note will be heard. These controls can be removed from the display so that one pupil doesn't accidentally change another pupil's sounds.

Having defined a number of different sounds, each within its own box on the screen, you can select a sound and move it, the screen position affecting the pitch and stereo status.

You can play one note across the whole range of pitch or different sounds can be picked up and played together. The creation can then be recorded onto ordinary audio tape through the music tape.

You can also record complete complete tunes or cords. Touching the box will then replace the contents and opens up a new set of recording applications such as recording all the cords for an accompaniment to a song in order across the screen or building complex sounds from up to eight sounds at different pitches.

You start with eight pre-programmed Soundspaces and a total of 10 can be stored on each disc. You can give them a full line description and one one can be defined as the default screen by placing it last in the list.

Walls can be placed within the Soundspace allowing up to 49 different textures, although in practice you'll need far fewer to produce a wide array of sounds.

If you opt for a Voltmace joystick for input you'll find it easy to move around the screen, but not particularly easy to pick up multiple sounds from a number of boxes. However, joysticks are sometimes easier to locate than touchscreens, so I was pleased to see the inclusion of this option.

Children can create new sounds simply and easily but without accessing the Soundspaces on disc or changing the wall structures. The automatic titling which can be edited later is a very useful feature and means that the keyboard doesn't need to be used at all.

It's when you use a Microvitec touchscreen that the true control over a musical instrument can be experienced and it is one with immense power and flexibility as well as being very simple to use.

Children find that they can move around within the space rather in the way that younger children experiment with finger painting. Indeed the comparison is quite apt – for colours easily leak into each other.

Soundspace is quite at home with nine and ten year olds in a mainstream primary school, and its use in a special school will make music accessible to a wide range of children with handicaps.

Probably the optimum device is a music keyboard like the Music 4000, as conventional notes can then be played and trapped within a box on screen to create a full tonal display.

I would have welcomed some simple graphical display of the "shape" of the sound so that children could analyse their favourite boxes, able to see the effect of changing the colour of the blocks describing that shape.

SoundWorlds Collection

Following Soundscape there is a range of programs to expand both the concept and the children:

Soundstory: Create written text, record music and written sound effects to produce musical scores, adventure games, drama soundtracks and so on.

Soundscene: Links sound with interactive graphics, helping pupils with hearing difficulties or sensory handicaps.

Librarian: Disc management utility combining a maximum of sixteen work discs into library discs for easy selection without teacher selection.

Soundsense: Working with Music 6000 sensor. Detects the position and movement of a body or limb to create a musical instrument activated by movement and dance.

Soundscape: A sound keyboard with over 600 sound shapes. Progressing from the keyboard to describe and notate their sound scapes and use them in other programs.

Soundshow: Over one hour of pre-recorded music to encourage active listening and fundamental decision making.

Soundscore: Allows full composition using coloured graphic score notation.

Summing up

Pitch would be tackled within a mathematical framework and there are obvious links with Attainment Target 12 of the Science Document. Its main drawback has to be cost as its immediate potential may be difficult to assess, but once in use within a school the product will prove both a useful and exciting tool.

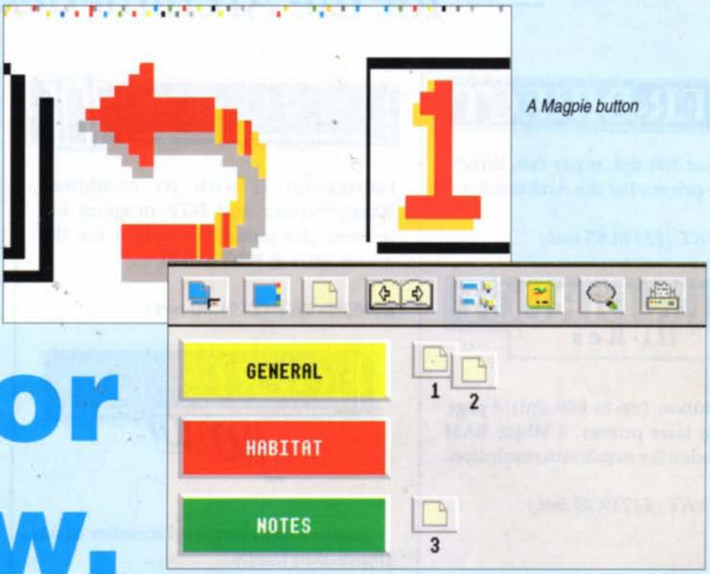
One for sorrow, two for joy

Paul Clemence goes bird watching with a difference

FOLLOWING on from their splendid word processor Pendown, Longman Logotron have spread their wings and produced an electronic book or viewdata package called Magpie.

It allows you to create pages of information – or binders – through which you can browse like a conventional book or search to match the things you are looking for with the contents of the binder.

Electronic books like Magpie represent a combination of information technology techniques. They allow simple processing of text and images placed within frames which you create on screen – while acting like databases with information organised in pages and frames.



A Magpie button

The standard contents page

Product: Magpie
Price: `54.00
Supplier: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.
Tel: 0223 323656
Requirements: BBC A3000 and Archimedes range

As you browse through the pages, *buttons* appear on screen. You click on these to move on, activate music or sound files or to reveal hidden graphics or messages.

For example, in one of the sample screens you are presented with a picture of a welder not wearing safety goggles. A message appears next to him inviting you to click where you think he needs protection. As if by magic the goggles appear.

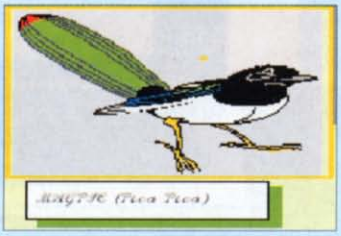
As well as text, Magpie is able to show sprite, draw and some music and sampler files which play when you click on them. Maestro music files are supported, but my early version didn't support Rhapsody.

There is a simple recorder in the supplied software, but it requires some sound sampling hardware to be fitted your Archimedes before it can be used. Judging by some of the example files, this can be very effective.

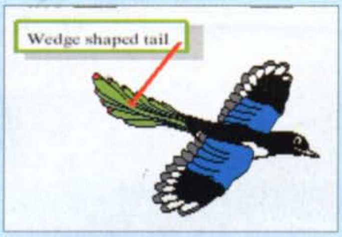
Magpie is supplied with examples and resources including another application called !MagpiRead with which you can distribute your work for others to read.

The excellent manual has a very good tutorial section, so much so that after an hour I felt more than confident about my ability to create new binders.

I was particularly impressed by the versatility of the contents page which allowed me to reorganise pages and sections as well as transfer pages from one section to another.



Using windows for captioning



Arrows can be easily added

What you can't do is transfer frames from one page to another or just save them for later use. All page numbers are automatically updated and any links between pages are also redirected by the software.

You can give binders a title page and these appear instead of the contents page on opening a binder. Another easy to use and very effective feature is the ruler. This is a pointer which can be used to connect labels to drawings, can be any available colour, of various thicknesses and have any one of three different styles of arrow head.

The frames can have borders and backgrounds and the general page colour can also be set. Text can appear in any font you have, but remember that if you intend to make your work available to others you can't distribute the fonts since they are copyright.

Summing up

I've only one complaint to make about this really excellent package and that is that it is not possible to change the style of text once entered. This is not really important, but if you feel you need this and other advanced features you should perhaps look at Genesis.

For my money Magpie is perfect for the primary and lower secondary age range and could probably be pushed a great deal further. Even if your school is already committed to work with Genesis, Magpie would still be a valuable introduction for many users.

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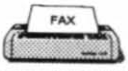

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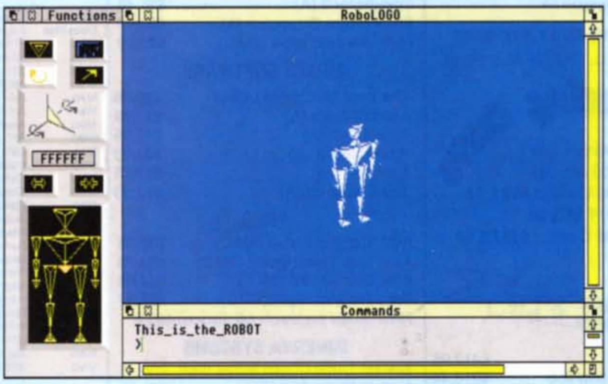

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```

Using the Robot in RoboLogo

NOW here's something I bet you never expected to see, a package converted from the Nimbus to the Archimedes – and jolly good it is too. Tiny Logo and Tiny Draw come together as a package from Topologika and were originally designed for use in Northamptonshire's junior schools on the Nimbus.

Tiny Logo sets up an introduction to this quintessentially educational language. The screen presents a drawing area divided into a grid using dots with a nice chunky arrow resting in the middle. Along the top of the screen is a menu of eight direction arrows, a hooter, numbers to 10 and a pencil. The arrows represent rotation through 360 degrees in 45 degree steps. Click on an arrow and the screen arrow faces that way. Click on a number and the arrow moves that many dots in its current direction. The dots may be switched on or off at any time.

Clicking on the pencil raises or lowers it so you can move without drawing, there's a clear screen icon to start again and the hooter hoots.

To create sequences of commands you select your direction arrow and drag it down into one of the sequence of boxes at the base of the screen, then drag your number down. Having stored your procedure you can run it by clicking on Go at any one of three different speeds.

Children can explore the idea of repeating sequences by selecting the repeat icon, which will run the procedure over and over.

There are eight different pen colours and screens may be dumped to a printer. Procedures can also be saved to the disc.

Tiny Draw does much the same thing for computer-based line drawing. The screen presents a drawing area and two menus – colours and options. The options are very straight forward. You can draw in two thicknesses – thick or very thick, select outlines of squares, triangles, circles and rectangles each in two sizes, fill an area with the selected colour using a little grey jug and rub out.

These tools provide enough for any infant child to produce all sorts of interesting work. The nice thing about it is that the colours are bright and the lines bold, exactly the sort of artistic structure young children like to work in but without the disadvantage of everything turning into a brown mess as things are over-painted.

Pictures can be saved at any point to become part of Tiny Draw's opening Gallery sequence which randomly displays the saved pictures – just the job for parents' evenings.

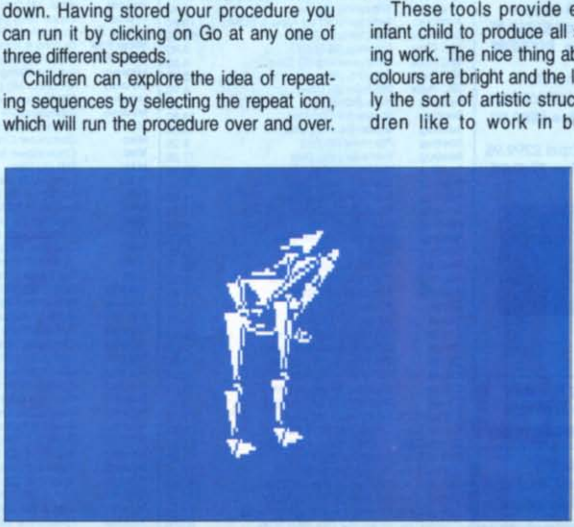
Meanwhile, Silicon Vision have been working at the other end of the Logo ability range and **RoboLogo** should generate quite a bit of interest in schools.

It works on three levels using a subset of full Logo. The first is a standard turtle with all the expected graphics commands. There's quite enough here to cover the various Attainment Targets that require the use of a screen turtle, allowing for procedures to be built and stored and recursion to be used.

Having explored a flat plane, children can move on to Jet mode. The Turtle, now a Jet, moves through space using all the simple Logo commands plus Roll, Pitch and Yaw.

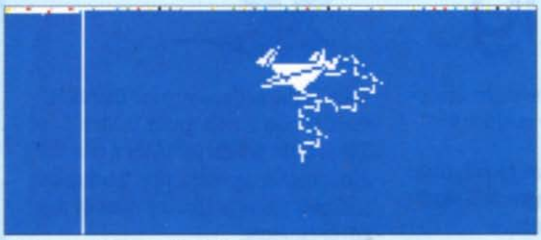
The nice thing about this is that children can take the procedures they created with the Turtle and then use them as a basis for 3D work, turning their SQUARE into a CUBE. Some of the effects you can get using repeat in 3D produce stunning polyhedrons from very simple procedures.

Finally we move to Robot mode. Here a jointed figure can be moved around using the standard commands. However, you also have full control over the various parts of the robot, so you can make it walk, bow, jump –

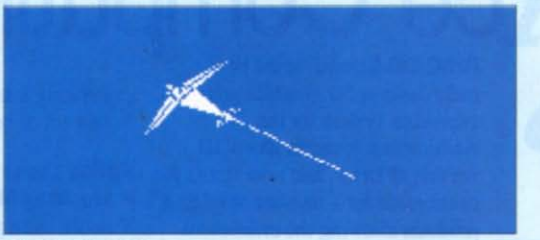


It moves, it walks, it takes a bow...

➤



Koch's snowflake using the turtle



Drawing with a jet-plane

whatever. You can also change its shape, and a very impressive demo shows it turning into a bird and flying off. All this activity is described in Logo procedures.

To further help with this activity there is an Animation Control Panel which allows you to set up complex movement sequences or create new primitives like WALK or FLY.

The manual is thorough and instructive and it may be that schools will see this package as a way of introducing control technology on the screen rather than by using complex and expensive equipment. Certainly it's an interesting and exciting form of the language, taking full advantage of Risc technology.

Summing up

Tiny Logo is an excellent introduction to Logo activities for younger children. It provides exactly the kind of friendly, safe environment they need to take their first steps towards full Logo activities.

Tiny Draw is also mouse driven and very intuitive, and both programs build skills that children will later use in a whole range of packages on the BBC A3000.

As introductions to Logo and computer arts packages they are both excellent, the linkage from Tiny Draw to !Paint is obvious, but the leap from Tiny Logo to a full blown version is greater and there may be room here for another, intermediate, package. Schools will be able to get children straight into these activities, even at a pre-reading level, and they'll probably find their way into special needs departments. From the point if view of home use, if you've got young children, there's nothing to beat it at the price.

RoboLogo is very useful in the home as well, providing an environment in which children can further explore their school work. Its drawback, especially for primary schools, will be the price – as an extension activity it comes very expensive. But if schools decide to use it instead of a complete version of Logo it could be a very viable alternative.

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Giving DTP a big hand

Bruce Goatly fails to resist the temptation to perpetrate a pun

Product: Ovation
Price: £113.85
Supplier: Beebug Ltd, 117 Hatfield Road, St Albans, Herts. AL1 4JS
Tel: 0727 40303
Requirements: Archimedes or BBC A3000 with at least 1Mb of memory

OVER the past couple of years no fewer than four software houses have undertaken the task of developing desktop publishing software for the Archimedes, indicating their evident confidence in the machine's outstanding suitability for DTP work.

Now, after a longish wait and a two-phase release, Beebug have brought forth their contribution to the DTP arena, bringing the number of completed packages to three – or four if you count Impression Junior separately.

The Ovation package comes as a slip case containing a ring-bound 200 page manual, four discs and a handy reference card. The standard of presentation is professional and attractive, though the end of the manual betrays the software's piecemeal release – the section on the spelling checker is tacked on to the appendixes and, alas, there is no index.

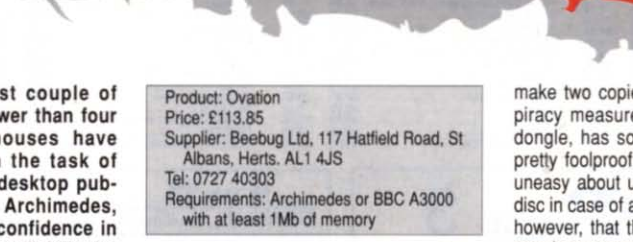
The four discs consist of a program disc containing Ovation itself, a !System folder and a dot matrix printer driver; a work disc with fonts and some sample documents, pictures and stories; a clipart disc of Ovation documents embodying a wide range of illustrations; and an extras disc comprising other printer drivers and utilities for use with Ovation.

The fonts provided are SwissB, Paladin, Vogue and SymbolB. The first three, each of which comes in regular, italic, bold and bold italic variants, correspond to Helvetica – as does Acorn's Homerton font – Palatino and Avant Garde. The last contains Greek and mathematical symbols.

Setting up the software is not a matter of just copying the programs to a backup program disc, as the Ovation application must always be installed on any other disc with a special program that copies Ovation and then validates the copy – but you can only make two copies in this way. As an anti-piracy measure it avoids the contentious dongle, has so far proved reliable and is pretty foolproof, but it still makes me a bit uneasy about using Ovation from my hard disc in case of a disc crash. Beebug tell me, however, that they will be charitable about genuine cases of tragedy.

Double-clicking on the !Ovation application brings up its icon, a rather attractive scroll and quill pen. Clicking on it opens a document window with a distinctive appearance: Instead of going for completely non-modal operation like Impression, or putting program tools in a separate window as in Acorn DTP, Beebug have cunningly elected to incorporate a tiny toolbox into the window border.

As well as showing the current chapter and page numbers, the tools on offer are for text insertion, creating new text, picture frames and lines, and linking text frames together so that text flows between them.



Use the Edit option to cut, copy and paste text.

- Keypresses are shown in bold courier type, for example:

Ctrl R to display the rulers.

Chapter 1. Before you start

Using the mouse

The names of the three mouse buttons are shown below.

The Ovation document window, complete with tools

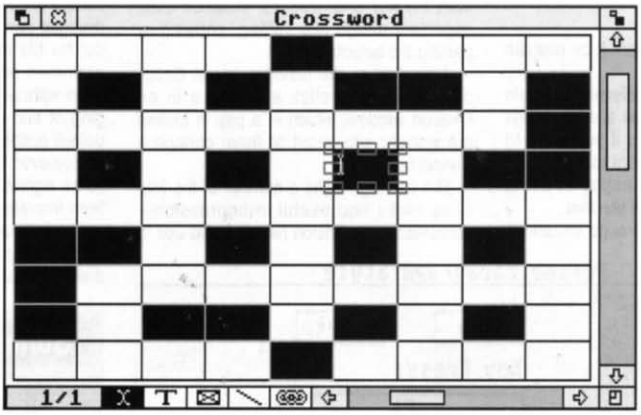
Ovation refers to text frames, picture frames and lines collectively as objects.

As with the other Archimedes DTP packages, text and picture operations proceed in frames, but in contrast Ovation insists that when you are creating a frame you must specify whether it is for text or a picture.

Ovation's text frames behave in much the same way as other DTP ones: They have a background colour or can be transparent, they can have borders – though it's on all four sides or none – and they can repel text both inside and outside.

Text flowing around a frame will do so only to left or right of it, not on both sides. The choice is automatic – the side selected being the one where the gap is widest.

Picture frames will hold sprites and Draw files, which can be resized, trimmed or panned within the frame. A menu option enables you to hide all pictures for faster scrolling around the page.



Build your own crossword grid with repeated lines and frames

Ovation also lets you draw lines and arrows anywhere on the page, at any angle and colour, and you can repeat them at specified distances.

It's much more natural and convenient to do this on the page than to transfer !Draw images into their own frames for things like tables or lines labelling imported diagrams. Drawing crossword grids is a doddle, too.

The program is unusual on the Archimedes in that objects are treated hierarchically: One created inside another frame is a *child* and cannot be moved outside it. An operation on the parent frame such as cutting, moving or resizing will also be carried out on any children. The children can themselves have children, too.

Although this way of working is convenient and a useful discipline most of the time, it can be annoyingly restrictive when you want to move an object outside the frame it's nested in – you can't, except by using cut and paste. I would prefer a more flexible approach.

On-screen rulers and guidelines help you position objects. Unfortunately the guidelines themselves can only be positioned visually, not digitally, so absolute accuracy is impossible.

Another aid to uniformity is that master pages can be created and used to define a different page layout in each chapter, although as with Acorn DTP if you alter a master page the new layout will only be used in new pages rather than reformatting the relevant chapter. I felt this was a shortcoming with Acorn DTP, though I can see how it makes life simpler.

The master page also lets you set up several text columns of equal width in one frame – useful for modular documents like magazines and newsletters. Master pages and their associated styles can be saved to disc separately as style sheets.

Text can be typed and edited by cutting, copying and pasting just as in other DTP packages and the normal find/replace options are present. An intriguing feature is that the clipboard can be viewed in its own window, so you can easily see what was last cut to it, whether text, graphic, frame or line. This idea has been borrowed from the Macintosh and could be useful.

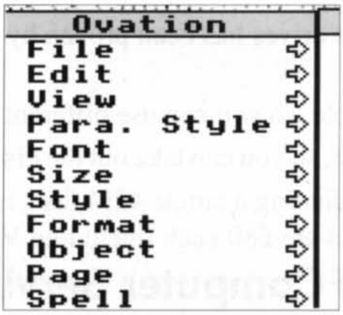
A system of definable paragraph styles is provided, operating in much the same way as Acorn DTPs. You can also apply fonts, sizes, styles and formats to text locally, without having to define a style first. There is, however, no way of applying style tags to text before importing it into Ovation, which I feel is a serious omission.

I also found it irritating that it wasn't possible to apply a new text format such as Centre after pressing Return at the end of the text and then just type in the new format. Instead I had to type first and apply the format afterwards.

As with Impression, individual letter pairs can be kerned – moved closer together or further apart – to improve the appearance of headlines, but Ovation is the first Archimedes software to offer tracking, which applies kerning over whole sections of text. It can be very effective used with capitals to give headings a touch of class.

Earlier versions of Ovation had a font selection system that let you choose only the family name as the font. Any variants such as italic or bold were selected separately under Style, and the software would check for synonyms such as oblique or heavy.

This is still the case, but now Ovation also lists as separate fonts any it can't fit into sensible sub-categories, such as ultrabold. So now you can at least access all your fonts, at the cost of a longer font menu. The pages can be viewed at almost any scale on screen – an improvement on Acorn DTP – and printing can be scaled too, even using different size factors horizontally and vertically.



Ovation's long main menu

Print options are less comprehensive than in Impression though: There's no way of printing multiple pages on one sheet or arranging pages automatically for a pamphlet, for example.

The latest version of Ovation has a very effective spelling checker and hyphenation facility, both of which are essential for serious DTP work.

You need at least 2Mb of memory for them to work, but serious DTP is hard with only 1Mb anyway. For proper hyphenation you have to build up your own dictionary of exceptions to the rules used by the program, as the dictionary supplied is empty.

Unlike Impression, the main spelling dictionary is held in memory in a form that can be completely updated – you can delete words from the master dictionary as well as adding them. Since both DTP packages misspell *benefited* Ovation, therefore, has the advantage.

Utilities provided include a character selector, !CharSel, which is also good for creating drop capitals, but it crashes unceremoniously if you have too many fonts in your !Fonts folder. Naughty. There is also a module that affords access to new screen modes and a program to let you create your own extra modes

I found Ovation generally pleasant and easy to use, though not niggle-free. The software felt a little sluggish in comparison with Impression on my unaccelerated A310, so that moving the text cursor with the mouse took an appreciable fraction of a second rather than being instantaneous.

In consequence, moving the mouse too quickly after clicking resulted in selecting a piece of text unintentionally because of the delay in responding to the mouse click.

Frames were also slow to respond, not always being selected with the first click. In contrast though, Ovation was faster than Impression at scrolling very large text.

The on-screen tools are easy to use, though I suspect that having to draw them all the while is what makes moving the document window around noticeably jerky.

The main menu, with 11 items, is rather too long for my taste, but many of the submenu options have key shortcuts, so with experience you use the menu less.

The range of key shortcuts is bewilderingly large and is not always intuitive – Shift+Control+P swaps the case of a letter, for instance – so it can take some time to get to know them.

In fact I found one of the key shortcuts particularly infuriating. When typing fast I

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tend to hit both Control and A by mistake when aiming at A.

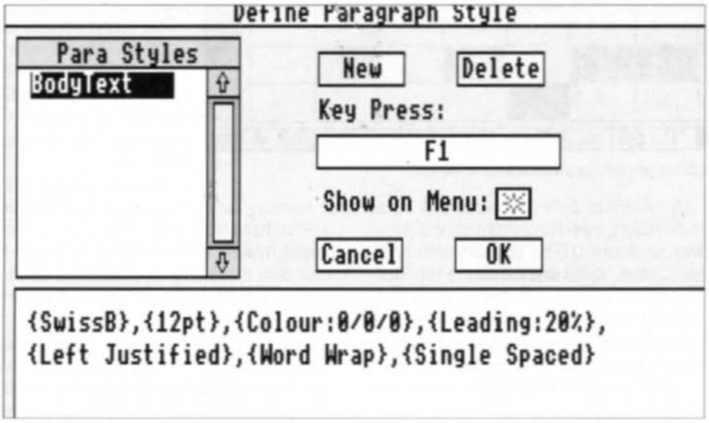
In Ovation Control+A selects the whole text and the next keypress silently brings up a dialogue box asking if you want to delete text. No, I didn't want to delete the whole text and I was unhappy at being brought to a screaming halt like that.

There are also some strange omissions from the key shortcuts, for instance quite important things like cutting, copying or pasting the selected object.

Almost all of the dialogue boxes disappear when you click elsewhere in an Ovation window, which is a pity. It makes me wonder why most of them contain a Cancel button.

The package lacks a number of the features that I find useful in Impression – abbreviation expansion (which I also use to correct my commoner mistypings), a single dialogue box for editing styles, a key shortcut for file information, view scales programmed on function keys, panning on page without using the scroll bars, pretagging of text styles and the ability to save default options for starting up.

However, to be fair, Ovation possesses some significant elements that are missing from Impression, like small capitals, tracking control, automatic document saving, a visible clipboard and a neat and easy line drawing capability.



Key Press: F1

{SwissB},{12pt},{Colour:0/0/0},{Leading:20%},
{Left Justified},{Word Wrap},{Single Spaced}

The style dialogue box

Summing up

Ovation is described by Beebug as a professional desktop publisher, yet its price puts it in direct competition with Impression Junior, which is aimed at the home and school markets rather than at businesses. Professionalism is an attitude to a job and you can get just as good results from Ovation as from other Archimedes DTP packages.

In the end the question is not so much what Ovation will do or how it does it, but whether it makes good results easy to come by. Happily, it does.

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PROBLEM Solved

Your technical questions answered by MIKE COOK

Mixing the drives

RECENTLY I acquired a faulty dual 3.5in disc drive from a friend. Sides one and three won't read or write but zero and two work perfectly. I'm not bothered about fixing the broken drive but I'd like to get the working one linked with my 5.25in drive.

I know that I need to completely disable drive one – the broken one – and reconfigure drive zero as drive one, but I don't know how to do it. Could you explain it please?

Also I've heard that adjusting the keyboard links can alter the speed of drive access – I did use *FX255 to force this effect in software but although the sound of the drive changed dramatically I couldn't tell if it was faster. Is it possible to damage the drive by doing this? – **Tim Broughton, Harrogate, N. Yorks.**

● *Your best option is to remove the broken disc drive completely , but if you can't do that it should be unplugged. If you open up the case you'll see a ribbon cable going to each drive which carries the signals. In addition you'll see a seperate four pin power connector going to each drive. Disconnect the ones that are plugged into the faulty drive.*

You need to have the 5.25in unit as drive zero – which it is already – and the smaller drive configured to be drive one and it's possible you'll need to remove the terminating resistor.

All makes of drive are slightly different and the label of the retailer on the outside doesn't necessarily bear any relation to the actual manufacturer, so it's not possible to produce a picture of what you need to do. However the general arrangement is the same:

Somewhere on the component side of the drive's electronic board will be a row of links or switches – they are usually close to the signal connector. These are the drive select pins, and the numbers zero to three should be etched on the board beside them. You'll see that link zero is made (joined). Comparing this to the non-working drive, you'll see this has link one made.

Topics on the agenda...

- Mixing it up with drives
- Taking the hiss out of Massssters
- Motor control project problems
- Plus 3 load failure
- Double-sided disc drive or not?
- Which way to upgrade?
- BBC Micros in faraway places
- Problems with interference

All you have to do is make the working drive match the non-working one. As for the terminating resistor, you'll see that on one board there is an extra pack which looks like a chip. Make sure it is not fitted on the working board.

You can now link the two using a standard cable or appropriate adaptor. I don't recommend you run the drives off the same power supply because this is inviting trouble. Links three and four of the keyboard link group control steptime, settle time and head loading of the drive and adjusting these can speed up modem drtves a little, but the overall effect won't be very noticeable for the short files usually found on BBC Micro discs.

Stop the hissing

I HAVE a four year old BBC Master and would like to know how to suppress the background hiss from the computer's loudspeaker. It has been getting louder and more irritating over the last few months. – **Graham Young, Gosport, Hants.**

● *The hiss is a combination of the output amplifier itself and interference from the rest of the micro. It can get worse as the machine gets older, but this is unusual.*

Perhaps the simplest method is to unplug the speaker, or better, fit a switch on the speaker lead. If you're seeking an electronic solution your best move is to use some testing equipment to find out where the hiss coming from.

It could be C16, the 47nF capacitor, or LM386 audio amplifier, IC13. Further back, it might be the LM324 pre-amplifier, IC9, or the power supply decoupling C15 or C17.

It might be worth placing another capacitor – any value greater than 10µF will do – across these to increase the decoupling effect.

Good motor control

I AM working on a project that involves driving motors from the BBC Micro. I think it should work, but I'd be grateful if you could answer some questions – I've enclosed the circuit diagram.

I am using all eight data lines and the earth from the User Port – is there any risk to the BBC Micro the way I have it set up? Also my teacher says it's bad practice to draw power directly from the User Port or from the auxiliary power supply as this puts a strain on the micro, is this true?

Finally, is it safe to control small motors in this way as I've heard they can send spikes back into the User Port which fry the 6522 chip? I have used diodes to protect it as much as possible. – David Williams, Folkestone, Kent.

● *The circuit you sent should work, although the diode is shown the wrong way*

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PROBLEM Solved

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round. To protect the supply from back EMF caused by inductive loads it should be wired so that it is reverse biased. That means the cathode – the end with the stripe – should be connected to the positive supply.

At the moment it would short the load and probably burn out the darlington driver.

There's no need to have 10kΩ resistors on the input lines as the 6522 side B (User Port) can drive darlingtons directly. If you must have them make them about 3kΩ.

In addition I would have pull up resistors, again 3kΩ, on the micro's 5v line on the User Port outputs.

There's no problem drawing power from the micro from either source as long as you don't take more than about 500mA. However if you run motors this could create interference spikes that could cause the machine to crash although no physical damage would be done.

The worst damage you could do is to blow the 6522 VIA and these cost under £2.

Electron Plus 3 poser

I RECENTLY got a faulty Plus 3 from a friend. It will read the disc directory but won't load any files. Does it need the Plus 1 to work properly like the Pres AP3?

Also I'd like to be able to do some DTP and CAD – is it possible on the Electron? – **B. Jones, Penarth, S. Glamorgan.**

● *You don't need a Plus 1 to use a Plus 3, so yours is faulty, but the fact that it will read the directory shows that it is quite capable of reading data off the disc.*

This suggests that the circuitry that controls the drive head movement is at fault. Someone with a little test equipment and a bit more knowledge would be able to sort this out.

As to DTP or CAD on an Electron, it probably could be done but only to a very limited extent. Even with the lowest level of software you really need a disc drive, printer and mouse or trackball.

Checking the other side

I BOUGHT a second-hand BBC Micro recently with a 40/80 disc drive in a handmade case. I don't know if it's double-sided, so how can I find out? My DFS is the Pace Amcom.

Are there any companies that supply casings for disc drives, as I don't like this one? – **M. Roberts, Caernarfon, Gwynedd.**

● *The simplest way to test whether you have a double-sided disc drive is to format drive two. If you can do so, you have the double-sided variety. Otherwise you haven't.*

Having said that, the Amcom DFS is notoriously non-standard, so I recommend you upgrade to one from Acorn or Watford Electronics first. Maplin, Verospeed or Radio Spares will all supply disc drive covers.

Grain dryer interference?

CAN you help me with an intermittent problem I am having with my BBC Micro which contains Wordwise Plus and the Watford Electronics DFS 1.3. The trouble started when I moved into a new house next to a grain dryer which causes the voltage to fluctuate.

The problem is that the machine is all right for days and will then freeze when I boot a disc – the display comes up with Basic spelt Bacic. I have to switch off for at least an hour before it will work again.

I have been back to the dealer twice but then the machine worked perfectly – but failed when I got it home again. – **S. A. Rogers, Wisbech.**

● *Intermittent faults are the worst kind as you can't trace them until they appear. It's very unlikely that voltage fluctuations would cause the effects you are describing, it would just make the machine crash and then switching it one – or just pressing Control+Break – would make it all right again.*

The misspelling of the start-up message points to bit four in the memory misbehaving. This could be due to a bad memory chip but, more likely it's a faulty socket or a cracked track.

This idea is backed by the fact that it only started after you'd moved – the motherboard could have been distorted in transit causing a break.

The best way to trace this sort of trouble is to try to induce it by pressing carefully on the processor and rom sockets. When you find a chip that produces the effect when pressed the fault will be nearby.

Crossing the pond

I AM going to the USA and Canada and would like to take my BBC Micro, Opus disc system and Star LC-10 printer with me. What do I need to do to use them? – **G. Clarke, Glasgow.**

● *You can take them all with you but you'll need a step-up transformer to boost the 110 volts to the 240 volts we use here. One transformer will be enough to drive all the equipment, but as they are very heavy you may prefer to buy one when you get over there.*

You will also need some form of TV monitor as the TV standards over there are incompatible with ours.

Additionally you should be careful about taking electronic equipment and magnetic media through airport security. Be sure to check before you go about the current regulations, and don't let your discs go through the X-ray machines.

Which upgrade route?

DURING the last few months I have been looking towards buying a new micro to replace my BBC Micro. The A3000 is very attractive from the viewpoint of speed and the fact that a lot of my own Basic programs will work on it.

But the Atari ST is a lot cheaper and it can read the discs that I use on the Apricot micros at college. Can you advise me please? – **Kevin Hallas, Doncaster, S. Yorkshire.**

● *The problem I have in recommending the ST is that in my experience they are not particularly reliable. Nor, when they go wrong, is there a good success rate in repairing them.*

Assuming that the Apricots you use are PC-compatible – the early ones weren't – the A3000 is also compatible using either the PC Emulator or, more practically, a DeskTop accessory like PC-Access.

Having said that, there are a lot more good games available for the ST, but the games situation for the A3000 is getting better.

Beat those bad characters

WAY back in the July 1989 issue of *The Micro User* there was a game for the Model B called Fred Drip. Having typed it all in, a friend of mine came to me in desperation as the game refused to recognise character collisions. My friend, a Master 128 owner, knew he'd typed the program in correctly.

He had used the checksums program, and in case there were wrong checksum numbers he laboriously re-checked the program line by line, character by character. On looking closely at the listing it was clear that the programmer had fallen foul of one of Acorn's time bombs.

When the Model B was first manufactured with the 0.10 operating system only 32 characters – 128 to 159 – were user definable. To allow for future expansion Acorn mapped all the other *top bit set* characters to the same memory area in blocks of 32.

The result was that in graphic modes if you told the machine to print characters 128, 160, 192 or 224 you actually printed character 128. For some reason in the User Guide Acorn always referred to the top block of 32 characters, 224 - 255, so everyone thought that these were the proper ones to use.

Later with the advent of the 1.0 operating system the concept of exploding the character set was introduced. While, by default, the situation was the same as before, if you issued *FX20,1 then memory was grabbed from normal user ram so that the entire character set could be uniquely re-defined.

This was, unfortunately, rather poorly organised, giving the program the responsibility of moving itself and re-setting PAGE, so that the newly-defined characters didn't corrupt the program.

Few people used this, and when the Master 128 came along the entire set was made available by default without any messing about, as it is on the Archimedes.

None of this matters very much for most character printing, but problems arise when you try to use osbyte 135 to read characters from the screen.

This is a very useful method of collision detecting in games, but if you print characters 224 to 255 on the Model B and then try to read them back you'll get 128 to 159. On the Master and Archimedes, however, the correct values 224 to 255 will be returned. If you have the characters exploded on the Model B you will again get the correct value returned.

The final joker in the pack is that, when using Mode 7 you always get the correct value returned, as none of these are re-definable and, in all but the Archimedes, the character is read by fetching the actual byte value from the screen memory.

The solution when writing games or any other programs that re-define the character set, is to use only characters from 128 to 159. Also, to avoid using machine code use a function like the one below to read back characters and your game will work correctly on the entire Acorn range:

```
100 char%=FNchar(3,10):REM ex
ample call
900 DEFFNchar(X%,Y%)LOCALA%:A
%=135:VDU31X%Y%:=(USR&FFF4 AN
D&FF00)DIV256
```

where *X%* and *Y%* are the screen co-ordinates of the character position you want to test. Notice that it is permissable to leave out the colon after the DEFFN and the commas in the VDU command.

If you want a superfast version try the one below. You must set the resident integers A%,U%,V%,W% to 135, &FFF4, &FF00, 256 respectively, in your initialisation routine and you cannot then use them for anything else. The name of the function has also been cut down to one letter.

```
900 DEFFNc(X%,Y%)VDU31X%Y%:=(USRU%
ANDV%)DIVW%
```

Using this version will knock a fifth off the processing time for each call to the routine, which means that little bit extra speed which could make all the difference.

● *So now you know why some programs aren't compatible across the range – and how to make sure yours always are in future!*

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Protection racket

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IN the early days of computing I used to get letters from people worrying about damaging their computers by pressing the wrong button. Fortunately that fear is now mainly a thing of the past. However, there is still one common way you can cause mayhem.

The danger lies is the joystick or analogue input port, as it has a direct connection to the converter chip. This is a D7002C which is CMOS – Complementary Metal Oxide Semiconductor, which is a description of how the circuit is laid down.

And there are certain rules you must follow when connecting to CMOS devices in order to avoid trouble:

First of all, they don't like voltages applied to them when there is no power going to the chip. Secondly, and much more important, they don't like voltages ranging outside the power rail limits.

The converter chip has a four input multiplexer, which means that any one of four inputs can be switched to the converter. Think of it as an input switch.

This means that we can read four different analogue voltages via the ADVAL(X) command, where X is the channel number. While these inputs have some protection built into the chip they are especially vulnerable to excess voltage.

Most people tend to think that this simply means something in excess of five volts, but it also means voltages lower than zero volts. What we are talking about here are negative voltages. The merest whiff of a negative voltage is enough to blow up the input transistors on the multiplexer.

Whenever my students blow up a chip in this way it is inevitably channel 0, so some of my machines have labels on them telling what channels will not work. The solution is simply to replace the D7002C, but these cost about £6 each and you never have one when you want it.

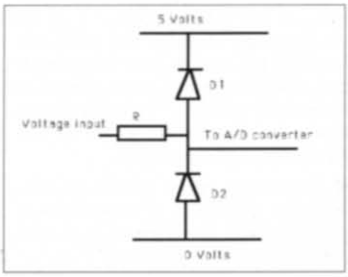
5 Volts
D1
R
Voltage input
To A/D converter
D2
0 Volts

Figure I: The protection system

So this month let's look at how to protect your A/D chip from maltreatment. In doing so we shall also provide a board that makes much easier connections to the port, as well as an optional improvement in the converter's temperature stability.

The basis of the protection system, shown in Figure I, consists of two diodes and a resistor. A diode is a device that allows electricity to flow through it in only one direction, which is indicated by the arrow on its symbol.

When a diode has current flowing through it we say it is *turned on*. We require a certain voltage to turn on a diode but once that is achieved the voltage remains virtually constant no matter what current is flowing through it.

The trick is to use diodes to catch any over or under voltage on our input. If the voltage is taken above 5 volts diode D1 is turned on and the input to the A/D converter can't get any higher than 5 volts plus the diode's turn on voltage. Any excess voltage is developed across the resistor R.

➤

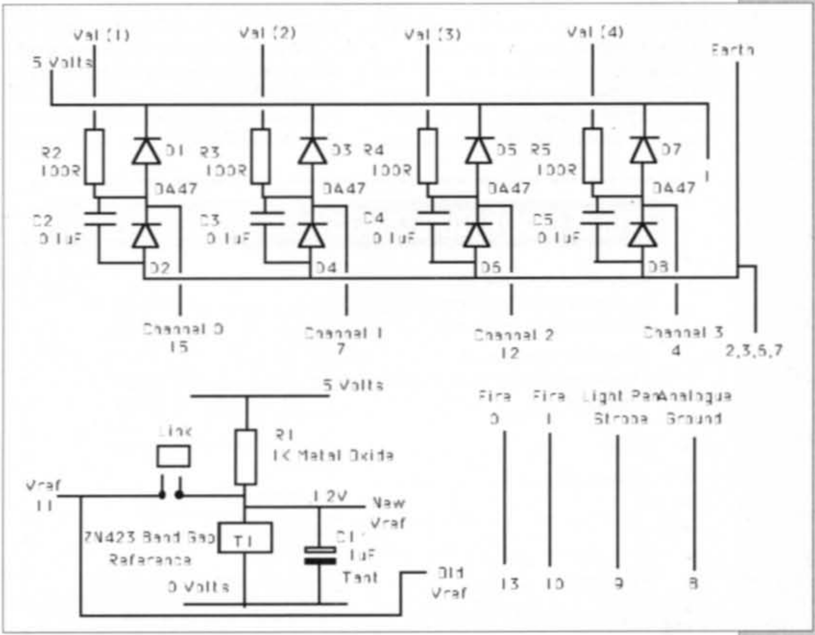
Val (1)
Val (2)
Val (3)
Val (4)
5 Volts
Earth
R2 100R
D1
R3 100R
D3
R4 100R
D5
R5 100R
D7
0A47
0A47
0A47
0A47
C2 0.1uF
C3 0.1uF
C4 0.1uF
C5 0.1uF
D2
D4
D6
D8
Channel 0 15
Channel 1 7
Channel 2 12
Channel 3 4
2,3,5,7
5 Volts
Link
R1 1K Metal Oxide
Vref 11
1.2V
New Vref
ZN423 Band Gap Reference
T1
C1 1uF Tant
0 Volts
Old Vref
Fire 0
Fire 1
Light Pen Strobe
Analogue Ground
13
10
9
8

Figure II: The full circuit of the protection board

Similarly any negative voltage causes D2 to turn on, then current flows from the zero volt line through the diode and resistor. Again the voltage on the input of the A/D chip can't go more negative than the diode's turn on voltage.

Now you might think that this is fine, but we still have some negative voltage on the input and although it's only the turn on voltage of the diode, won't this damage the chip? Well yes it would if this voltage was greater than the turn on voltage of the diodes formed in the chip.

The A/D converter is made from silicon, the most commonly used semiconductor. However by using another semiconductor material – germanium – for our protection diodes we can ensure that our protection diodes turn on before the diodes in the chip.

This difference in turn on voltage is due to something called the *band gap*, which is a fundamental property of the element. If you want to read more about this get a book on solid state physics.

In the early days germanium was used for most semiconductors, but it is much more expensive than silicon. Also the smaller turn on voltage presented problems with noise and interfering signals, so nowadays most semiconductors are made from silicon.

However in certain specialised applications it is advantageous to have this lower turn on voltage, and this is one of them.

Figure II shows the full circuit of the protection board. The protection part is essentially the same as in Figure I duplicated four times.

I have included a capacitor across the input to to cut down any electrical noise generated by the diode. This comes from thermal addition of the electrons – called thermal noise – and also from the lumpy nature of electron charge – shot noise.

Note that channel 0 is labelled ADVAL(1), this shows how the BBC Micro was designed by committee. The hardware guys quite sensibly labelled their channels from 0 to 3, however the software lads used the numbers 1 to 4 to access the readings. This often confuses students, so the inputs are labelled in the way they will write the software.

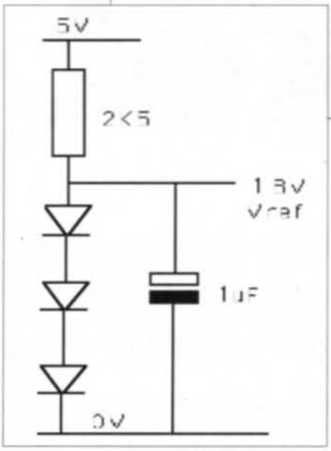

Figure III: The internal voltage reference

The second part of Figure II shows the optional reference voltage stabiliser. Now a voltage reference is what the analogue to digital converter uses to measure its input voltage against.

The A/D will give a maximum reading when the input is greater or equal to the reference. Similarly the reading will be exactly a half maximum when the input voltage is a half the reference voltage.

The problem is that if this reference voltage changes the reading will change even though there has been no change in the input voltage. From the software point of view it will look as if the input has changed.

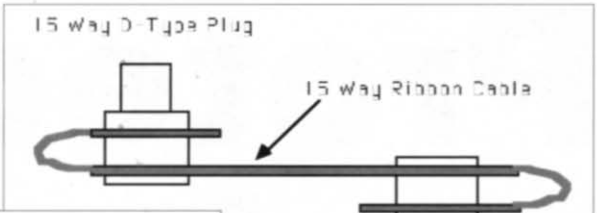

Figure IV: The arrangement of the IDC extension cable

If you look at Figure III you will see the circuit of the internal voltage reference used in the computer. It is simply three diodes with current flowing through them. The voltage reference is therefore derived from three times the turn on voltage of a silicon diode.

Now this is virtually constant independent of what current flows through them, so that any variations in the 5 volt supply will be smoothed out and we will have a stable reference of about 1.8 volts. Unfortunately things are not quite as simple as this, because a diode's turn on voltage varies with temperature. This means that as the computer warms up you will get different readings for the same voltage input.

To prevent this from happening we use a precise band gap reference device that is compensated for temperature variations. In Figure II, R1 provides a supply of current to T1 which has a constant 1.2 volts across it. All we have to do is connect this point to the voltage reference output from the computer.

This is a lower voltage than that presented by the diodes, so it will in effect short them out, turning them off. The current supplied by the internal resistor will be shunted down the band gap device.

This will provide a more stable reading and, as the reference is lower, the A/D converter will be that little bit more sensitive. If you don't want this to happen there is an optional link so you can leave the system as before.

This sort of project really demands a printed circuit board with printed component reference to make connecting up to projects easier. The board and all the components are available as Body Build pack No. 70.

To make matters even easier the board has a 15 way D-Type socket on it just like the computer. Computer and board connect together using a cable consisting of two 15 Way D-Type IDC plugs arranges as shown in Figure IV. The cable can be obtained as Body Build pack No. 71 both as a kit and ready assembled.

● *So there you have it, a board that combines the twin virtues of convenience of connection with the protection to give you piece of mind. See you next month.*

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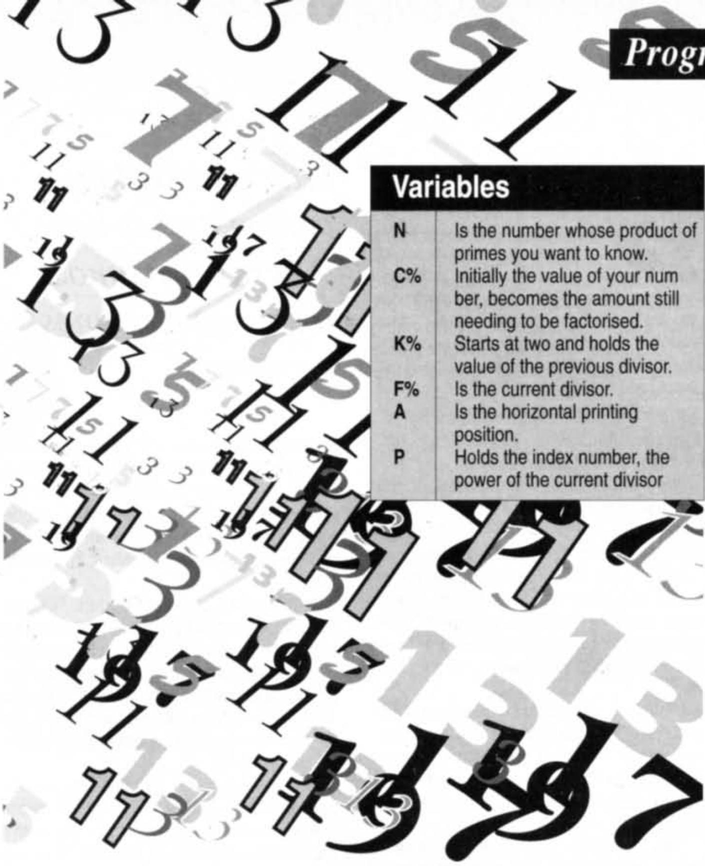
With this program you can find all the prime factors of any number from 2 up to 2.1 x 10^9 which is close to the upper limit of 2,147,483,647 for integer variables. When you enter a number, the micro tests it for divisibility by two and repeats this with the current quotient until the test fails.

Then, in the same way, it tests the current quotient by the odd numbers 3, 5, 7 and so on, using index notation if it finds the number can be divided more than once by the same factor.

Here is an example of the program's output given the number 123,456:

```
 6
2  x 3 x 643
```

You can watch the factors appearing while the micro checks to see if they will divide into whatever is left of your original number after the last prime factor was found.



Variables

N	Is the number whose product of primes you want to know.
C%	Initially the value of your number, becomes the amount still needing to be factorised.
K%	Starts at two and holds the value of the previous divisor.
F%	Is the current divisor.
A	Is the horizontal printing position.
P	Holds the index number, the power of the current divisor

Product of Primes

Jon Millington explores the wonderful world of maths magic

Program breakdown

Line 30	selects Mode 3 and switches off the cursor.
Lines 40 to 240	are the loop to keep the program running until you press Escape or Break.
Lines 40 to 70	are the loop asking you to enter a number from 2 to 2.1 x 10^9.
Line 80	sets C% to your number, K% to two and A and P to zero.
Lines 90 to 210	are the main program loop to convert your number into the product of its prime factors.
Line 100	makes the divisor either one if it was two, or two less then it was.
Lines 110 to 170	are the loop which finds out if whatever is left of your number is divisible by the current divisor.
Line 120	adds one to the divisor if it was two, otherwise it adds two.
Line 130	sets the index number to one, or adds one to it if the current and previous divisors are the same.
Line 140	makes the index number zero if your number is prime.
Line 150	prints the current divisor.
Line 160	gives the previous divisor the value of the current one.
Line 180	prints as a superscript the index number if it is greater than one.
Line 190	moves the printing position at least five places to the right unless the micro found more than one of the same factor in line 130.
Line 200	divides what is left of your number by the current divisor.
Line 220	tells you that your number is prime.
Line 230	scrolls up the display ready for your next input.

```
  0 REM Product of Primes
 10 REM by Jon Millington
 20 REM (c) The Micro User
 30 MODE 3:VDU 23,1,0;0;0;0;
 40 REPEAT:REPEAT
 50 PRINT TAB(13,20)SPC 20
 60 INPUT TAB(0,20)"Your number? "N
 70 UNTIL N>1 AND N<2.1E9
 80 C%=N:K%=2:A=0:P=0
 90 REPEAT
100 IF K%=2 THEN F%=1 ELSE F%=K%-2
110 REPEAT
120 IF K%=2 THEN F%=F%+1 ELSE F%=F%+2
130 IF K%=F% THEN P=P+1 ELSE P=1
140 IF F%>SQR N AND A=0 THEN P=0
150 IF P=1 PRINT TAB(A,23);F%"  x"
160 K%=F%
170 UNTIL C% MOD F%=0 OR P=0
180 IF P>1 PRINT TAB(A-4,22);P
190 IF P=1 THEN A=A+LEN STR$ F%+4
200 C%=C%/F%
210 UNTIL C%=1 OR P=0
220 IF P=0 PRINT TAB(0,23)"is prime";
230 PRINT TAB(A-2,23)" "''''''
240 UNTIL FALSE
```

```
  0 =    0 0
 10 =    0 0
 20 =    0 0
 30 = 4624 4
 40 = 5D46 9
 50 = 4EB8 3
 60 = B1F5 3
 70 = DEBB 1
 80 = E07A D
 90 = BFBA E
100 = E6DF 2
110 = BFBA 6
120 = E11C 6
130 = C0D4 D
140 = 4848 1
150 = 6F97 3
160 = 22C5 F
170 = E80E 7
180 = 7FB7 F
190 = DF1C 3
200 = 45D0 4
210 = C117 7
220 = A990 A
230 = B79A F
240 = 226C 6
```

Malcolm Wilkins demonstrates how to write an almost unbeatable games program

CONNECT Four is a game which takes place in a frame with seven columns and six spaces to each column. You and your opponent take it in turns to drop coloured counters into the frame from the top, and the object is to build up a winning line of four or more counters of your own colour in horizontal, vertical or diagonal directions.

Strategy is called for as you try to build your own lines while at the same time blocking those of your opponent.

Now you have the chance to test your skill using the program Make Four listed here playing against your BBC Micro, with three levels of difficulty to choose from.

Type in the listing and ensure you've made no typing errors using the checksums. It's very important to save it before you run it, because if there's an error in the machine code it could destroy all your hard work.

When run, the empty board will be drawn and you will be asked if you want to go first. Just press Y or N. If you want to change the difficulty level before you start, press the spacebar and choose a number from one to three – three is the hardest.

The columns are numbered one to seven and to select one press its number followed by Return. You can change your mind by pressing Delete and choosing again.

How it works

All computer strategy games are similar in that they have to allocate a number to each possible move to show how good it is. Because this is a fairly simple example there is no need for sophisticated tricks to cut down the processing required to choose a move.

All that is needed is to check each column from one to seven and find the one with the highest value, which will be the best move. Some machine code is needed to do some of the checking though, as Basic is a bit too slow.

The machine code is called from the procedure PROCcount. It is given the board position and the type of counter being looked for – either those of the program or the human opponent. The machine code routine always assumes the start position is already occupied by the colour it's looking for.

It then scans outward along the horizontal, vertical and diagonal lines intersecting the position, checking how many counters of the same colour are in a continuous line through that position. The result of the scan is returned in three variables which give the number of lines of two, three and four counters respectively.

The strategy used for choosing a move value goes like this. First the program checks to see if the column being examined is full – if so moving there is obviously impossible, so a very low value is chosen for that column.

Next it checks to see whether playing in that column is a winning move. If it is, a very high value is chosen to ensure its selection, otherwise a value is calculated that depends upon the number of rows of two and three counters that a move there would produce.

Then the move is checked from the point of view of the opposing player, because a move that would be good for the opponent is also a good blocking move for the program to make.

Finally it checks to see if the position one space above the move being considered is a winning one either for itself or for the human player.

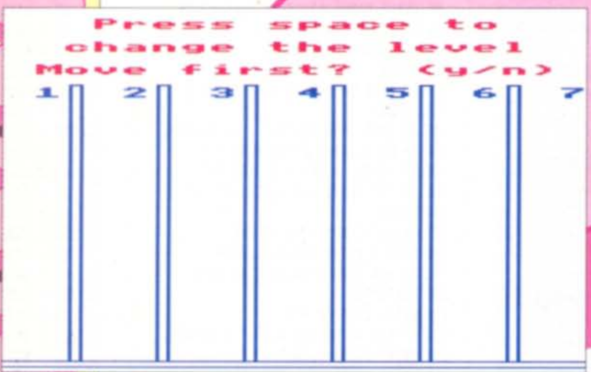
If so, that would be a bad move for the program to make, since it would allow the human to either win the next turn or block off one of its own winning lines. Level one is the easiest because it doesn't perform this last check.

The quality of play is also determined by the four parameters *c3*, *c2*, *h3* and *h2*. These control the emphasis placed on lines of three compared to lines of two, and also how much time the program spends building its own lines rather than blocking those of its opponent.

Good play is a compromise between defensive moves which block off your opponent's lines and attacking moves which build up your own lines.

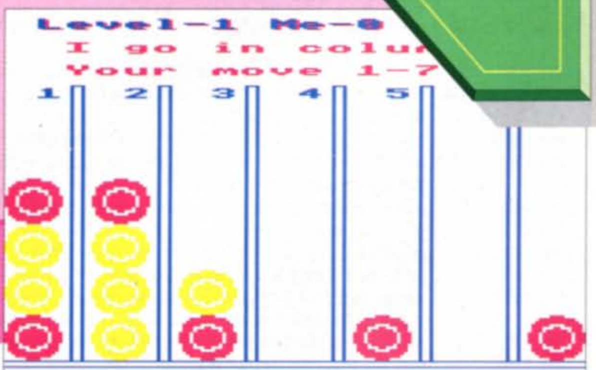
Playing at the easier levels, the emphasis is placed much more on attacking moves, so that it is comparatively easy for you to construct winning lines without the program blocking them.

The best strategy for the program seems to be to place much greater emphasis on lines of three than lines of two, but only slightly more emphasis on attacking rather than defensive play.



```
Press space to
change the level
Move first? (y/n)
1  2  3  4  5  6  7
```

Starting position



```
Level-1 Me-0
 I go in colu
 Your move 1-7
1  2  3  4  5
```

Halfway through

MAIN VARIABLES

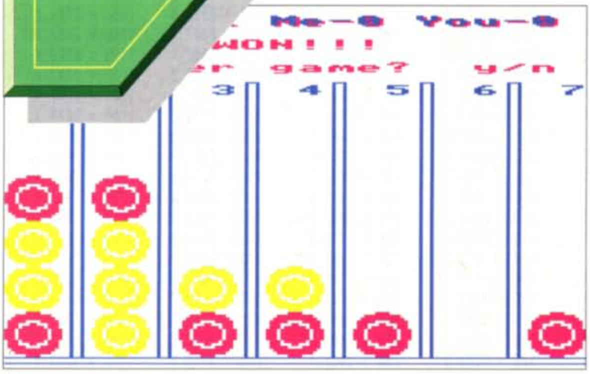
computerwon%	Flag to indicate if computer has made a line of four.
humanwon%	Flag to indicate if player has made a line of four.
computerwins%	Number of games computer has won.
humanwins%	Number of games player has won.
twos%	Number of lines of two counters around position *x%*, *y%*.
threes%	Number of lines of three counters.
fours%	Number of lines of four counters.
turnstaken%	Counts turns. If 42 have been made the board is full.
computer%	Memory representation of computer's counter.
human%	Memory representation of player's counter.
player%	Flag equal to either *computer%* or *human%*, depending whose move is being considered.
board$	Memory representation of an empty board. Full stops represent empty spaces and asterisks represent the edges of the board.
counter$	String representation of a counter for printing on the screen.
height%(column%)	Array giving the number of counters in each column.
sound%	Flag indicating if sound is on or off.

MAIN PROCEDURES

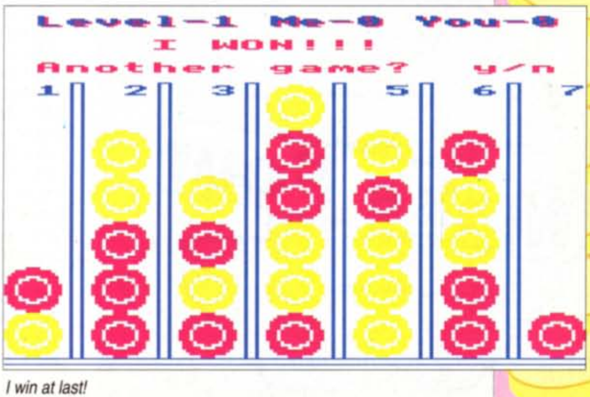
count	Performs a scan of board position *x%*, *y%* for either player move.
value	Uses the results of the scan to allocate a value to the given column to show how good a move it would be.
bestmove	Selects the column with the highest value.
computermove	Chooses the best move for the computer and makes it.
humanmove	Asks you for your move and makes it.
makemove	Updates the board information after a move has been chosen.
drawnewcounter	Draws the counter descending into the frame.
game	Allows you and the program to alternately make moves until either onewins or the board becomes full.

```
 10 REM Make Four
 20 REM by Malcolm F Wilkins
 30 REM (c) The Micro User
 40 REM not for Archimedes
 50 REM
 60 ONERROR GOTO 190
 70 *TV 0 1
 80 *FX 4 1
 90 MODE 5
100 HIMEM=&5700
110 PROCinitialisevars
120 PROCsetupcode
130 REPEAT
140 PROCinitialiseboard
150 PROCdrawboard
160 PROCgame
170 PRINTTAB(1,5)"Another game?  y/n"
180 UNTIL FNgetkey("yn")="n"
190 MODE7:PRINT"Bye then!"'':*FX 4 0
200 END
210 :
220 DEFPROCinitialiseboard
230 LOCAL col%
240 FOR col%=0 TO 8
250 height%(col%)=0
260 NEXT
270 $board%=board$
```

➤



Things look bad



I win at last!

➤

```
390 PROCaskifsound
  400 VDU 23,224,3,3,31,31,63,63,124,124
  410 VDU 23,225,192,192,248,248,252,252
,62,62
  420 VDU 23,226,113,113,119,119,239,239
,239,239
  430 VDU 23,227,142,142,238,238,247,247
,247,247
  440 VDU 23,228,239,239,239,239,119,119
,113,113
  450 VDU 23,229,247,247,247,247,238,238
,142,142
  460 VDU 23,230,124,124,63,63,31,31,3,3
  470 VDU 23,231,62,62,252,252,248,248,1
92,192
  480 counter$=""
  490 RESTORE 530
  500 FOR char%=1 TO 22
  510 READ ch%:counter$=counter$+CHR$ch%
  520 NEXT
  530 DATA 32,32
  540 DATA 8,8,10,224,225,8,8,10,226,227
  550 DATA 8,8,10,228,229,8,8,10,230,231
  560 ENDPROC
  570 :
  580 DEFPROCaskifsound
  590 COLOUR131:COLOUR0:CLS
  600 VDU23;8202;0;0;0;19,0,4;0;
  610 PRINTTAB(4,6)"Connect Four"
  620 PRINTTAB(4,7)"ÑÑÑÑÑÑ"
  630 PRINTTAB(1,16)"Do you want sound?"
;TAB(3,18)"(Press Y or N)"
  640 sound%=(FNgetkey("yn")="y")
  650 ENDPROC
  660 :
  670 DEFPROCcount(x%,y%,player%)
  680 ?&72=9*y%+x%:?&74=player%
  690 CALL code%
  700 twos%=?&75:threes%=?&76:fours%=?&7
7
  710 ENDPROC
  720 :
  730 DEFPROCmakemove(column%,player%)
  740 turnstaken%=turnstaken%+1
  750 height%(column%)=height%(column%)+
1
  760 ?(board%+column%+9*height%(column%
))=player%
  770 PROCdrawnewcounter(column%,height%
(column%),player%)
  780 ENDPROC
  790 :
  800 DEFFNmovevalue(column%)
  810 LOCAL twos%,threes%,fours%,value%
  820 IF height%(column%)=6 THEN =-1000
  830 PROCcount(column%,height%(column%)
+1,computer%)
  840 IF fours%>=1 THEN computerwon%=TRU
E:=1000
  850 value%=c3%*threes%+c2%*twos%
  860 PROCcount(column%,height%(column%)
+1,human%)
  870 IF fours%>=1 THEN =900
  880 value%=value%+h3%*threes%+h2%*twos
%
  890 IF height%(column%)=5 OR level%=1
THEN =value%
  900 PROCcount(column%,height%(column%)
+2,human%)
  910 IF fours%>=1 THEN =-900
  920 PROCcount(column%,height%(column%)
+2,computer%)
  930 IF fours%>=1 THEN =-800
  940 =value%
  950 :
  960 DEFFNbestmove
  970 LOCAL moveval%,bestmoveval%,col%,b
estmove%
  980 bestmove%=0:bestmoveval%=-1000
  990 FOR col%=1 TO 7
 1000 moveval%=FNmovevalue(col%)
 1010 IF moveval%>bestmoveval% THEN best
moveval%=moveval%:bestmove%=col%
 1020 NEXT
 1030 =bestmove%
 1040 :
 1050 DEFPROCgame
 1060 LOCAL yn$,computerwon%,humanwon%,t
urnstaken%
 1070 computerwon%=FALSE:humanwon%=FALSE
:turnstaken%=0
 1080 IF FNcomputerfirst THEN PROCmakemo
ve(RND(5)+1,computer%)
 1090 REPEAT
 1100 PROChumanmove
 1110 IF NOT humanwon% AND turnstaken%<4
2 THEN PROCcomputermove
 1120 UNTIL computerwon% OR humanwon% OR
 turnstaken%=42
 1130 PRINTTAB(0,3)SPC(20);TAB(5,3);
 1140 IF computerwon% PROCfanfare:PRINT"
I WON!!!":computerwins%=computerwins%+1
 1150 IF humanwon% PRINT"You won.":human
wins%=humanwins%+1
 1160 IF NOT(computerwon% OR humanwon%)
PRINT"It's a draw."
 1170 ENDPROC
 1180 :
 1190 DEFPROCdrawboard
 1200 LOCAL x%
 1210 CLS
 1220 GCOL 0,0
 1230 FOR x%=1 TO 6
 1240 MOVE 192*x%-48,32:DRAW 192*x%-48,8
06:DRAW 192*x%-24,806:DRAW 192*x%-24,32
 1250 NEXT
 1260 MOVE 0,28:DRAW 1280,28
 1270 MOVE 0,12:DRAW 1280,12
 1280 COLOUR0
 1290 FOR x%=1 TO 7
 1300 PRINTTAB(3*x%-2,7);x%;
 1310 NEXT
 1320 COLOUR1
 1330 ENDPROC
 1340 :
 1350 DEFPROCdrawnewcounter(column%,heig
ht%,player%)
 1360 LOCAL x%,y%,colour%
 1370 IF player%=human% colour%=1 ELSE c
olour%=2
 1380 COLOUR colour%
 1390 x%=3*(column%-1)
 1400 FOR y%=2 TO 30-4*height%
```

```
  10 =    0 0     270 = 7C1A A     530 = B0C0 2     790 = 9719 2    1050 = 74F3 2
  20 =    0 0     280 = ED0F 8     540 =  122 4     800 = DE9D 4    1060 = B9EA A
  30 =    0 0     290 = 9719 8     550 = 20D2 F     810 = AA8F 0    1070 = E95D D
  40 =    0 0     300 = CB2E 1     560 = ED0F 7     820 = AFE7 3    1080 = 198F F
  50 =    0 0     310 = B871 C     570 = 9719 7     830 = EB14 2    1090 = BFBA 9
  60 = AC40 0     320 = C219 A     580 = 3D51 2     840 = 4AFF A    1100 = 1079 2
  70 = E145 1     330 = C1DB C     590 = 6401 E     850 = 341E 0    1110 = 4D77 9
  80 = 63E9 5     340 = 5C64 E     600 = D926 B     860 = 1531 0    1120 = 4D4B 0
  90 = 30D0 8     350 = 6E78 4     610 = 6CD9 6     870 = 835F D    1130 = E376 B
 100 = DE4D 4     360 = 51C6 A     620 = 1DE2 2     880 = 8BF7 4    1140 = 79BA 2
 110 = 550E D     370 = 2504 0     630 = 1E7C D     890 = C20F F    1150 = B8E6 F
 120 = 76A3 7     380 = 7196 D     640 = 8943 3     900 = 3875 3    1160 = 3032 F
 130 = BFBA E     390 = 68E9 2     650 = ED0F F     910 = 877F 6    1170 = ED0F 9
 140 = 2E76 4     400 = AC13 9     660 = 9719 F     920 = EE8B 7    1180 = 9719 5
 150 =  6D8 C     410 = 4BF5 D     670 = A46F B     930 = B04F D    1190 = B51A E
 160 = 9E04 9     420 = 6B8F 9     680 =  9C0 9     940 = 6D77 F    1200 = 9FB0 6
 170 = 2278 5     430 = 9435 E     690 = 68C2 7     950 = 9719 6    1210 = 7A16 4
 180 = A8BE F     440 = F0B0 5     700 = 83F4 F     960 = 908F 4    1220 = 71BA C
 190 = 107F 5     450 = 4E3C D     710 = ED0F 9     970 = 7EC7 9    1230 = F784 6
 200 = FD2E 6     460 = B91D A     720 = 9719 D     980 = 33D5 B    1240 = 3600 3
 210 = 9719 1     470 = F3E8 8     730 = AEA1 F     990 = 4061 C    1250 = 2C83 B
 220 = 6C01 8     480 = 5A19 2     740 = F29D 0    1000 = 849C 0    1260 = 9D88 B
 230 = 4A5A 9     490 = 37A2 B     750 = 7BE4 3    1010 = 8BDA E    1270 = 6E33 6
 240 = 1BDF 5     500 = 978E 8     760 = 56BD 1    1020 = 2C83 F    1280 = F968 2
 250 = 1C63 3     510 = 85CB 5     770 = 469B 6    1030 = 9E10 C    1290 = E7A5 7
 260 = 2C83 C     520 = 2C83 5     780 = ED0F F    1040 = 9719 5    1300 = 5A0D 9
```

```
 1410 IF y%=8 THEN COLOUR0:PRINTTAB(x%+1
,7);column%;:COLOUR colour%
 1420 PRINTTAB(x%,y%);counter$;
 1430 IF sound% THEN SOUND&11,-4,120-4*y
%,1
 1440 NEXT
 1450 COLOUR1
 1460 ENDPROC
 1470 :
 1480 DEFPROChumanmove
 1490 LOCAL humanmove%,twos%,threes%,fou
rs%
 1500 PRINTTAB(2,5)"Your move 1-7? ";
 1510 REPEAT:humanmove%=FNnumkey("123456
7"):UNTIL height%(humanmove%)<6
 1520 PROCclear
 1530 PROCmakemove(humanmove%,human%)
 1540 PROCcount(humanmove%,height%(human
move%),human%)
 1550 IF fours%>=1 THEN humanwon%=TRUE
 1560 ENDPROC
 1570 :
 1580 DEFPROCcomputermove
 1590 LOCAL computermove%
 1600 computermove%=FNbestmove
 1610 PROCmakemove(computermove%,compute
r%)
 1620 IF NOT computerwon% PRINTTAB(2,3)"
I go in column ";computermove%
 1630 ENDPROC
 1640 :
 1650 DEFPROCfanfare
 1660 IF NOT sound% THEN ENDPROC
 1670 LOCAL note%,pitch%,dur%
 1680 RESTORE 1720
 1690 FOR note%=1 TO 5
 1700 READ pitch%,dur%:SOUND1,-8,pitch%,
dur%
 1710 NEXT
 1720 DATA 60,4,80,2,100,4,60,3,80,8
 1730 ENDPROC
 1740 :
 1750 DEFPROCprintscores
 1760 LOCAL score$
 1770 score$="Level-"+STR$(level%)+" Me-
"+STR$(computerwins%)+" You-"+STR$(human
wins%)
 1780 IF humanwins%<10 AND computerwins%
<10 THEN score$=" "+score$
 1790 PRINTTAB(0,1)SPC(20)
 1800 VDU5:GCOL0,1:MOVE 8,988:PRINTscore
$
 1810 GCOL0,0:MOVE 0,992:PRINTscore$
 1820 VDU4:ENDPROC
 1830 :
 1840 DEFFNgetkey(allowed$)
 1850 LOCAL key$
 1860 REPEAT:key$=CHR$(GET OR &20):UNTIL
 INSTR(allowed$,key$)>0
 1870 =key$
 1880 :
 1890 DEFFNnumkey(allowed$)
 1900 LOCAL key$,key%
 1910 REPEAT
 1920 PRINT" ";CHR$(8);
 1930 REPEAT:key$=GET$:UNTIL INSTR(allow
ed$,key$)>0
 1940 PRINTkey$;CHR$(8);
 1950 key%=ASC(key$)-ASC("0")

1960 REPEAT:key$=GET$:UNTILkey$=CHR$13
OR key$=CHR$127
 1970 UNTILkey$=CHR$13:=key%
 1980 :
 1990 DEFFNcomputerfirst
```

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```
 2000 LOCAL key$
 2010 REPEAT
 2020 PRINTTAB(3,1)"Press space to";TAB(
2,3)"change the level"
 2030 PRINTTAB(1,5)"Move first?  (y/n)"
 2040 key$=FNgetkey("yn ")
 2050 IF key$=" " PROCchangelevel
 2060 PROCclear:PRINTTAB(0,1)SPC(20)
 2070 UNTIL key$<>" "
 2080 PROCprintscores
 2090 =(key$="n")
 2100 :
 2110 DEFPROCchangelevel
 2120 PROCclear:PRINTTAB(0,1)SPC(20)
 2130 PRINTTAB(2,1)"Current level: ";lev
el%
 2140 PRINTTAB(2,3)"1 easy to 3 hard"
 2150 PRINTTAB(2,5)"New level 1-3? ";
 2160 level%=FNnumkey("123")
 2170 IF level%=3 THEN c2%=4:h3%=15:h2%=
3 ELSE c2%=7:h3%=10:h2%=4
 2180 ENDPROC
 2190 :
 2200 DEFPROCclear
 2210 PRINTTAB(0,3)SPC(20);TAB(0,5)SPC(2
0)
 2220 ENDPROC
 2230 :
 2240 DEFPROCsetupcode
 2250 LOCAL addr%,byte$
 2260 RESTORE 2320
 2270 FOR addr%=&5750 TO &57C9
 2280 READ byte$:?addr%=EVAL("&"+byte$)
 2290 NEXT
 2300 ENDPROC
 2310 :
 2320 DATA A4,72,98,18,65,73,A8,E6
 2330 DATA 79,B1,70,C5,74,F0,9,C9
 2340 DATA 2E,D0,E,E6,7A,4C,52,57
 2350 DATA A5,7A,D0,E6,E6,78,4C,52
 2360 DATA 57,C6,79,60,85,73,A9,1
 2370 DATA 85,79,85,78,A9,0,85,7A
 2380 DATA 20,50,57,A9,0,85,7A,A5
 2390 DATA 73,49,FF,A8,C8,84,73,20
 2400 DATA 50,57,A5,79,C9,4,30,14
 2410 DATA A5,78,C9,4,30,2,E6,77
 2420 DATA C9,3,D0,2,E6,76,C9,2
 2430 DATA D0,2,E6,75,60,A9,0,85
 2440 DATA 75,85,76,85,77,A9,1,20
 2450 DATA 74,57,A9,9,20,74,57,A9
 2460 DATA 8,20,74,57,A9,A,20,74
 2470 DATA 57,60
```

Get it right ✓

```
1310 = 2C83 E
1320 = E949 1
1330 = ED0F 1
1340 = 9719 3
1350 = BA06 1
1360 = C094 1
1370 = 6893 3
1380 = ACF6 5
1390 = 192D 8
1400 = A19E A
1410 = DBA6 2
1420 = 8630 C
1430 = EAF5 3
1440 = 2C83 9
1450 = E949 B
1460 = ED0F F
1470 = 9719 D
1480 = A3BB A
1490 = 9DF9 C
1500 = 8F52 B
1510 = 7E5D 6
1520 = ED47 1
1530 = 9858 6
1540 = F8CC 3
1550 = B622 C
1560 = ED0F 2
1570 = 9719 A
1580 = 831C 9
1590 = 2ED1 4
1600 = E777 E
1610 = 25E9 F
1620 = A371 3
1630 = ED0F C
1640 = 9719 1
1650 = 7156 3
1660 = 53BE 1
1670 = 671A E
1680 = 18CD 5
1690 = E17D 7
1700 = 1CAF 7
1710 = 2C83 3
1720 = 6E62 A
1730 = ED0F B
1740 = 9719 9
1750 = B1C8 5
1760 = 58AC 7
1770 = 1CB5 2
1780 = F362 2
1790 = BB65 6
1800 = 57CE 5
1810 = 279A 2
1820 = 4E30 1
1830 = 9719 7
1840 = D2A7 3
1850 = E4FF 4
1860 = C38D 0
1870 = CCE5 6
1880 = 9719 A
1890 = 7371 0
1900 = 8B66 B
1910 = BFBA 4
1920 = 46B3 6
1930 = E870 B
1940 = 959B B
1950 = 835E 8
1960 = EEC3 3
1970 = FA79 E
1980 = 9719 6
1990 = DBA4 B
2000 = E4FF 9
2010 = BFBA 2
2020 = ED57 F
2030 = 71A3 4
2040 = D2A7 2
2050 = F0B4 F
2060 = 9EF7 9
2070 = 663F 8
2080 =  398 F
2090 = A00A F
2100 = 9719 5
2110 = FF77 5
2120 = 9EF7 B
2130 = A8EB A
2140 = DB65 4
2150 = EAB4 A
2160 = 52D3 4
2170 = B0F2 3
2180 = ED0F 5
2190 = 9719 F
2200 = 4623 3
2210 = 605C 1
2220 = ED0F 9
2230 = 9719 8
2240 = C561 D
2250 = F796 D
2260 = E0AB D
2270 = 5423 9
2280 = ABF4 3
2290 = 2C83 D
2300 = ED0F 5
2310 = 9719 A
2320 = ED4B C
2330 = 99E6 E
2340 = E744 1
2350 = E605 E
2360 = 630D 6
2370 = 8AE3 7
2380 = 275D 0
2390 = 3DD3 7
2400 = 6980 B
2410 = 80D4 2
2420 = CA80 A
2430 = C3E3 3
2440 = 4CC6 2
2450 = 36C0 9
2460 = BC4D 7
2470 = 1EB7 8
```

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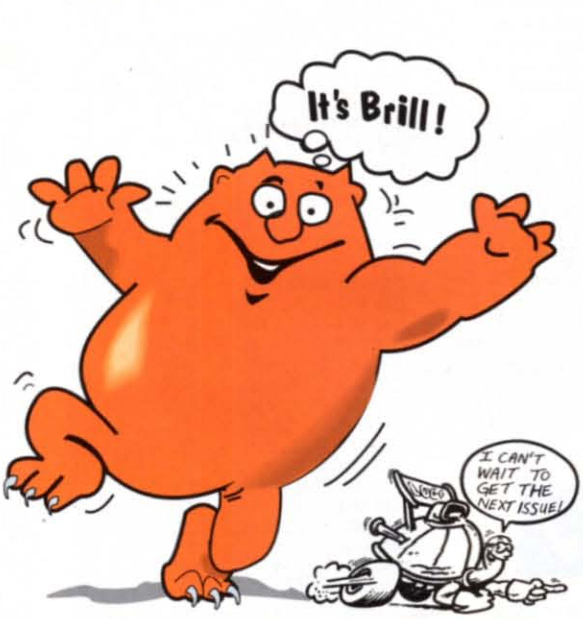

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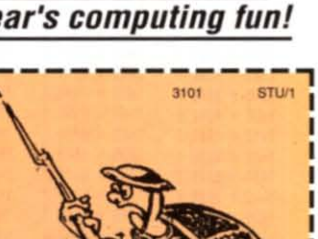


Pros and Protext

Paul Hendy traces the changes in this popular ST, Amiga and PC word processor as it makes its way to the Archimedes

Product: Protext 5
Price: £149.95
Supplier: Arnor, Protext House, 611
Lincoln Road, Peterborough PE1 3HA.
Tel: 0733 68909
Requirements: BBC A3000 and
Archimedes

PROTEXT has a long and distinguished pedigree, with versions produced for all the Amstrad machines as well as the Atari ST and Commodore Amiga. Its hallmark has always been an easy-to-use program where the user can swap easily between command and editing mode.

Being written in C it is, in theory, easily transferable between different computers, provided the libraries are available and thus new versions of Protext are launched simultaneously for the PC, Amiga, Atari ST and now the Archimedes.

This is excellent news for those who like a fast word processor and may have transferred from a different computer where Protext was already available.

Arnor have managed to retain the look and feel of previous versions, while adding more features to take advantage of the Archimedes' capabilities. This includes rudimentary mouse control of the cursor – the block cursor moves to the current mouse position when you click – and the ability to control the drop-down menus.

The program comes in a sturdy box with three discs and an excellent spiral-bound manual written by David Foster – a Protext expert of some years – showing the different options in a lucid way.

This can't be easy when the program operates in different ways on various machines with the one manual for all of them. However, I had no difficulty finding my way around as it has a very clear contents, index and glosssary.

As Protext is not wysiwyg you have no instant representation of what the final result will look like when printed. You can, of course, print a file to screen to check for footers, page numbers and so on.

Switching between editing and command modes is easily done by pressing Escape just like Wordwise. This version is not multitasking although there was a note with the package implying that a later version will be.

When in the command mode you can load documents, reformat text, print, or count words as well as using various other utility commands.

There are two types of command within the edit mode. The first is *immediate*, which is usually operated with Control and/or Shift keys. For instance, Shift+Delete will delete a word while Alt+B will insert a bold printer code.

The second type is the *embedded* command which is stored as part of the text. These are very useful and it is important to understand how they work. For example, Control+C can be issued while editing to centre a line, yet if the document is reformatted this centering will be lost.

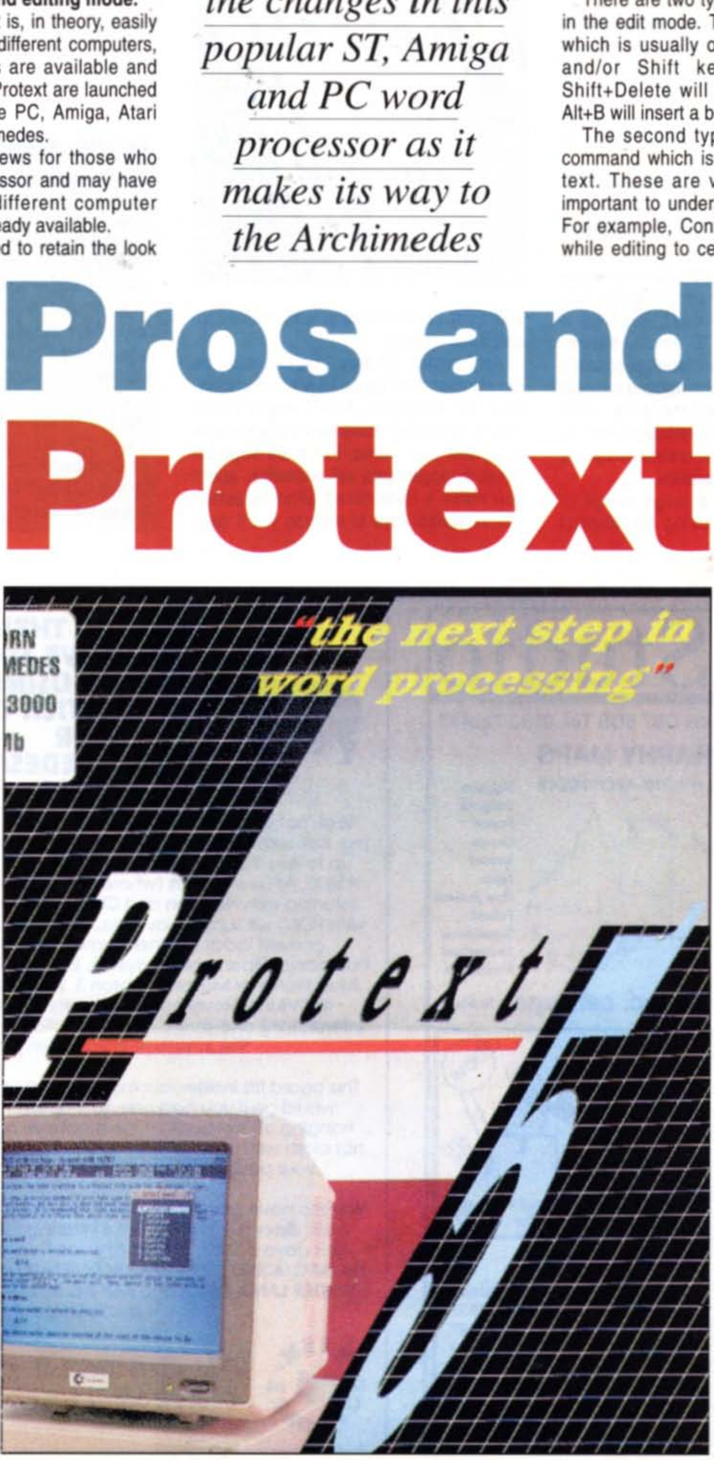
However, if you use the command Control+CE this is then embedded as part of the text and will retain the effect even when reformatting. Embedded commands can be used to format margins, headers, footers and the style of the document.

These controls are very easy to master, particularly using the drop-down menus. I don't like mouse control of word processing menus because you have to move off the keyboard.

Though mice are-reallyg1 supposed to enhance the user friendliness of a package I find this involves more effort and much prefer the combination of function and cursor keys. As most commands are duplicated by the Control key functions, this will be a relief to PC owners familar with the granddaddy of word processors, WordStar.

The spelling checker is extremely fast, however I prefer checkers to work through the text so that you always see

➤



the word in context, rather than be presented with a list of corrections needed and an option to see the word in context.

The range of words in the dictionary is impressive and some clever algorithms were at work to offer suggested alternatives.

Output is to a range of printers, including lasers, and the manual is an impressive demonstration of what can be achieved using Protext. Outputting to an Epson laser printer in LaserJet emulation was excellent with the normal range of fonts being available.

If Protext was only another word processor with a built-in spelling checker it would be good value for money. However, it is much more.

The embedded and external commands form part of a programming language that lifts Protext, making it something special. Embedded commands exist to design label programs, invoice generators and programs capable of conditional mail-merging with IF/ELSE/ENDIF loops, variables and so on, plus the option to create template files of your favourite formats.

Protext also has a large range of macro combinations using Alt, Control and Shift in combination with characters and function keys.

the next step in word processing
Protext
5

Any series of key strokes can be recorded and assigned to a key combination, for example, Alt+Y might insert *Yours sincerely* followed by six blank lines and your name. Far more sophisticated arrangements are posssible, and if you make a determined effort to assign often-needed keys to macros you'll save an enormous amount of time.

External commands can be grouped together in small files where complete lists of instructions can be written and stored, to be summoned at will.

An Exec file might be constructed to load a file, replace some words, insert another file, reformat, print two copies, pause and then print a label. If this sequence of commands was stored as *Mailshot*, the whole operation would be accomplished by issuing the one line EXEC MAILSHOT.

Summing up

I have always liked Protext – in spite of wishing that its spelling checker worked differently. It has an impressive range of features and is superb value for money.

Arnor's decision to write Protext in C and port it across a range of computers has enabled many people to enjoy its ease of use and power.

The suspected maxim of the software industry is maximum profit for minimum features. Arnor continually invert this and produce excellent programs, backed up by friendly and knowledgable technical support. Thoroughly recommended.

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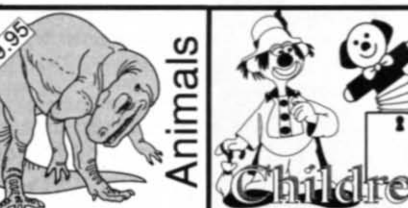

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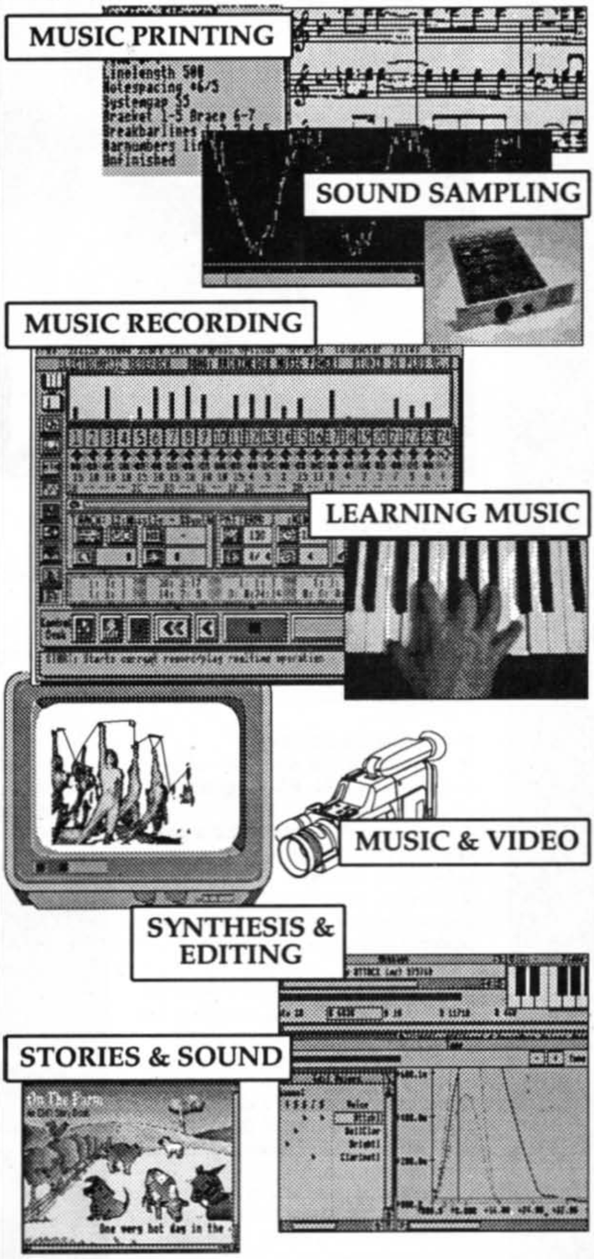

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The Learning Curve is tailor-made for people new to computing, especially for home users with children – a micro for the family with something for everyone.

As the Archimedes goes from strength to strength in schools, it's ideal for children. And the inclusion of Genesis supplements Information Technology in the National Curriculum.

Its versatility and ability to run PC programs such as dBase, Lotus 1-2-3 and Wordstar makes it a superb investment.

The huge amount of software now being produced for the BBC A3000 and Archimedes series means that you can expand your knowledge and ability in art, music, animation and even games. You'll never look back.

A taste of what's on offer comes on the Applications discs 1 and 2 supplied with all BBC A3000s. You can customise your DeskTop, play a quick game of patience – while doing something else – expand your musical knowledge by examining !Maestro and more.

All the programs and data you get with The Learning Curve is easily accessed, and there's even a video to introduce you to the system.

With one Learning Curve as the first prize, there's a comprehensive choice of eight runners-up prizes for owners both 8-bit BBC Micro and 32-bit Archimedes or BBC A3000s.

THE
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Archimedes runners-up prizes

Impression II – Computer Concepts' latest DTP package – can be used by anyone regardless of experience. Its adaptability makes it an ideal wordprocessor used at its lowest level, and a powerful and sophisticated professional page design and DTP product when using all its capabilities. The price of £194.35 wouldn't buy you anything comparable on any other machine.

Desktop Office from Minerva makes the most of their experience in the business side of the Acorn market. This integrated package contains a database, wordprocessor, spreadsheet, graphs and communications programs. All are simple to set up and, of course, multi-tasking. Data can be easily transferred between the different elements. At £129.95 it's amazing value for money.

Rhapsody is a superb music package from Clares. Costing £49.95 it's both a music composition and playback program. You can compose your masterpieces in full manuscript notation with very few limitation and on up to 24 staves. You can input !Maestro files too and play all your music back through the A3000 sound system or via a Midi instrument.

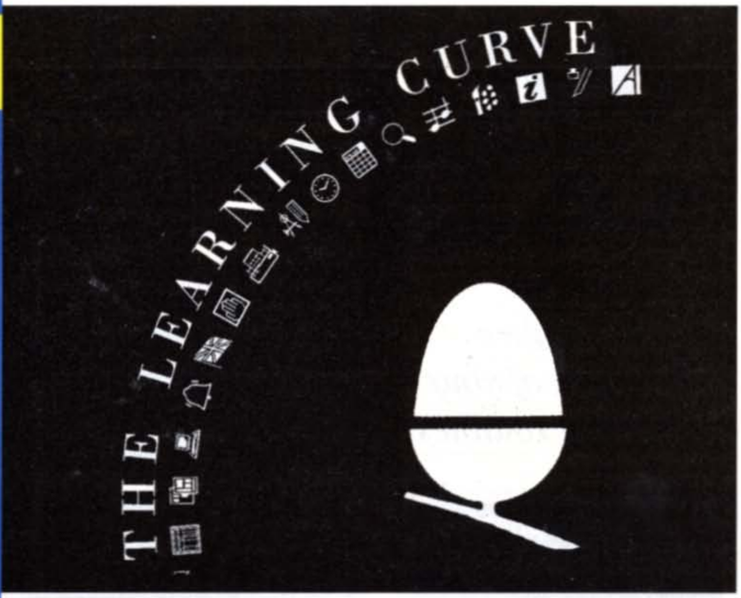
Interdictor II Two copies of this superb flight simulator are on offer. Normally retailing from Clares at £34.95 it's a game of immense depth and quality. A must for anyone with a yearning to fly, it has the feel of a real cockpit with interesting and complex missions for you to attempt.

BBC runners-up prizes

Inter-Word is the top-of-the-range BBC Micro wordprocessor from Computer Concepts. Lessons learned from the original WordWise made it into an extremely powerful package which uses the 8-bit micro to the full – and all for £56.35. Extremely easy to use, it includes such advanced features as automatic text formatting, multi-column printing and page design.

System Delta is Minerva's best selling BBC Micro business package. Costing £64.95, it's a flexible data handling system offering you the option to program it to meet your specifications.

Beta-Base, Clares' relaunched database, costs £49.95. A straightforward but powerful system, it allows a maximum of 65,000 records and 200 fields holding around 1,200 addresses on each 100k disc. The spooled files created within it are compatible with the major wordprocessors and transfer within the program itself is simple to achieve. You can also write your own utilities for accessing your valuable data.



ENTRY FORM

HOW TO ENTER

Put in order these six features to look for when buying a new computer and complete the entry form. Then make sure your entry arrives at **The Micro User** before March 29. The first correct answer with the most interesting or unusual reason for owning a will receive the first prize: The Learning Curve package and the next eight from the sack will receive one of the runners-up prizes. *Only one entry per household please.*

☐ **A.** A multi-tasking environment.
☐ **B.** A mouse-based environment.
☐ **C.** The speed of operation.
☐ **D.** State of the art technology.
☐ **E.** Value for money.
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ROUTINE MATTERS

Stephen Wade unveils another assortment of your interesting routines

Featuring routines to...

- Print out music staves
- Swap main and shadow displays
- List your Basic keywords and their tokens
- Convert sprites between two DTP packages
- Disable the Electron Plus 1 interface

If you have written a routine that may be of interest to other readers and is suitable for publication in this column, do not hesitate in sending it on disc or tape along with documentation to:

Stephen Wade, Routine Matters,
The Micro User, Europa House,
Adlington Park, Macclesfield SK10 4NP

Don't forget to give your name, address and telephone number, and enclose a stamped addressed envelope to guarantee the return of your media. Also provide us with a declaration stating that the routine is all your own work, has not been submitted elsewhere, and that we have your permission to use it.

Staved by a printer

Author: Thomas How
Language: Basic
Filename: Staves

THERE are many practical uces for musical manuscript besides the designated one. However, it is expensive to buy and time-consuming to make, two factors which usually discount its usefulness. But these problems can be overcome by using this program in conjunction with an Epson-compatible printer.

The staves are printed in graphics mode using the bit image escape sequence 76 and three pieces of information:

- How many individual staves are to be printed
- The size of gap between each stave
- The width of each set

The gap size is given in normal text line depths, and the width of each set can be any figure between 1 and 490 where the latter represents the full distance across an A4 page.

```
   10 REM Music staves printer
   20 REM by Thomas How
   30 REM (c) The Micro User
   40 REM ------------------
   50 MODE 7
   60 PRINT ''"MUSIC STAVES PRINTER"'':I
NPUT "Number of staves required",n
   70 INPUT "Gap between each set",g
   80 INPUT "Length of each set (1-490)"
,l:IF l<1 OR l>490 PRINT "  Bad number!"
':GOTO 60
   90 VDU 2:PRINT:FOR T=1 TO n
  100 FOR L=1 TO g:PRINT:NEXT
  110 FOR P=1 TO 2:VDU 1,27,1,76
  120 VDU 1,(2*l) MOD 256
  130 VDU 1,(2*l) DIV 256
  140 FOR I=1 TO (2*l):VDU 1,132:NEXT
  150 VDU 1,10:NEXT P:VDU 1,27,1,76
  160 VDU 1,(2*l) MOD 256
  170 VDU 1,(2*l) DIV 256
  180 FOR I=1 TO (2*l):VDU 1,128:NEXT
  190 VDU 1,10:NEXT:PRINT''':VDU 3:END
```

Disabling the Plus 1

Author: Alan Hurst
Language: Basic
Filename: Dsble+1

ALTHOUGH the Plus 1 is a very versatile interface for the serious Electron user, its presence can often have annoying consequences and implications. For example, additional rom chips can gobble up vital ram space, eventually causing a lack of memory.

The usual solution is to remove the unit by physically separating it from the micro. However, this often causes the innocent Electron to crash, taking us straight back to square one.

By using a couple of standard pokes, it is in fact possible to disable the unit from software – and that's precisely what the routine below does. Use the program as it stands or add the first five commands from line 50 into one of your own to achieve the desired result.

```
   10 REM Disable Plus 1
   20 REM by Alan Hurst
   30 REM (c) The Micro User
   40 REM March 1991
   50 OSCLI "FX 163,128,1":table%=!&FFB7
:?&212=table%?18:?&213=table%?19:?&2AC=0
:PRINT '"Plus 1 is now disabled.":VDU 7:
END
```

Basic keyword listing

Author: Graham Kendall
Language: Basic
Filename: Keywrds

IN certain programming circumstances it is useful to know the tokens attached to each of the Basic keywords – for example, in a routine to search through a program for a particular command such as PRINT.

The information can be found in a couple of books but this obviously means researching the information. Much the easiest way to find the details is to obtain them directly from the table held within the Basic chip itself.

On the 8-bit range of Acorn micros the Basic language is stored in a memory position which starts at location &8000. The program (right) searches through the rom from this address until the table is found. Following this, a long three column list is printed up which contains all the information from the table.

```
  10 REM Print Basic keywords
  20 REM by Graham Kendall
  30 REM (c) The Micro User
  40 REM
  50 MODE 7:PROCInit:PROCDisp:END
  60 DEF PROCInit
  70 I%=&8000:Found=FALSE
  80 REPEAT:I%=I%+1
  90 IF ?I%=&41 AND ?(I%+1)=&4EAND
   ?(I%+2)=&44 THEN Found=TRUE
 100 UNTIL Found:ENDPROC
 110 DEF PROCDisp
 120 REPEAT:REPEAT:PRINT CHR$(?I%);
 130 I%=I%+1:UNTIL ?I%>127
 140 PRINT TAB(12);~?I%;:I%=I%+1
 150 PRINT TAB(15);~?I%:I%=I%+1
 160 UNTIL ?(I%-2)=&D3:ENDPROC
```

First comes the Basic keyword itself, followed by its token in the second. A more obscure value is printed in the final column – it appears to be a code which connects keywords of similar functions.

Certain keywords – such as PAGE – can have two different tokens, so ensure you obtain the correct one by comparing the value in the final column with the other entries.

From one DTP package to another

Author: Stephen Brown
Language: 6502 code
Filename: DTPconv

ALTHOUGH the *Stop Press* package is quite excellent, it is easily beaten in one respect by *Fleet Street Editor*, and that involves graphics cuttings. If you happen to have both pieces of software, you will usually find that when it comes to producing a document including small pictures to complement the text, FSE is chosen due to its extensive library.

However, for those who prefer using SP instead all is not lost. Using the conversion program below, it is feasible to convert FSE cuttings into a format recognisable by SP, enabling you to have the best of both worlds.

The program has a quite complex background but in basic terms takes a Mode 4 sprite and converts it to Mode 0 format by doubling the width of each individual byte. This is done by taking each of the eight bits and repeating them twice to generate a 16 bit replica.

After the program has been typed in entering RUN causes a machine code file by the name of *FSE-SP* to be stored on your disc or tape.

To use the facility, first of all load FSE – along with the graphic cutting you intend to convert – and then save the **largest** possible graphics area.

After you have done this, exit FSE and load in SP. Once completed, select the star command option and type **FSE-SP* where filename is no longer than seven characters and can be found in the *G* directory.

As soon as you have done this, press the *Return* key until the window disappears – you have four seconds in which to do so. The FSE sprite will then load in – appearing on screen in a central position horizontally, but a little higher vertically – and after the conversion process is completed a message will appear to announce the fact. You are then free to use SP as normal.

Note that the conversion code runs in the memory area usually reserved for fonts. Therefore, to avoid corrupting any you may wish to use, load all the graphics cuttings in to begin with and the fonts afterwards.

```
   10 REM FSE to Stop-Press
   20 REM Direct screen convertor
   30 REM by Stephen Brown
   40 REM (c) The Micro User
   50 REM ------------------
   60 MODE 7:ctrl=&70:screen=&74:PROCcod
e:*SAVE "FSE-SP" 7000 +150 200F 2000
   70 END
   80 DEFPROCcode:FOR pass=4 TO 7 STEP 3
:P%=&2000:O%=&7000:[OPT pass
   90 .error1 BRK:EQUB &FF:EQUS "Filenam
e ???":BRK:.go SEC:JSR &FFC2:BEQ error1:
LDX #0:.loop JSR &FFC5:BCS done:STA name
st,X:INX:CPX #7:BEQ done:JMP loop
  100 .done LDA #13:STA namest,X:SEI:LDA
 &220:STA temp:LDA &221:STA temp+1:LDA #
start MOD 256:STA &220:LDA #start DIV 25
6:STA &221:CLI:RTS
  110 .start DEC counter1:BEQ now:RTS
  120 .now SEI:LDA temp:STA &220:LDA tem
p+1:STA &221:CLI:LDX #7
  130 .swap LDA ctrl,X:STA stack,X:LDA d
ata,X:STA ctrl,X:DEX:BPL swap:LDA #&C0:L
DX #name MOD 256:LDY #name DIV 256:JSR &
FFCE:STA channel:TAY:LDA #1:LDX #ctrl:JS
R &FFDA:LDX #22:STX counter1
  140 .loop1 LDX #31:STX counter2
  150 .loop2 LDX #0:STX counter3
  160 .loop3 LDY channel:JSR &FFD7:JSR d
ouble:LDY counter3:STA (screen),Y:LDA re
sult+1:STA (screen+2),Y:INY:STY counter3
:CPY #8:BNE loop3:LDA #&10:LDX #0:JSR ad
d:LDA #&10:LDX #2
  170 JSR add:DEC counter2:BPL loop2:LDA
 #&80:LDX #0:JSR add:LDA #&80:LDX #2:JSR
 add:DEC counter1:BPL loop1:LDY channel:
LDA #0:JSR &FFCE:LDX #7
  180 .loop6 LDA stack,X:STA ctrl,X:DEX:
BPL loop6:BRK:EQUB &FF:EQUS "FSE file ha
s loaded.":BRK
  190 .add CLC:ADC screen,X:STA screen,X
:LDA screen+1,X:ADC #0:STA screen+1,X:RT
S:.double STA byte:LDX #0:.loop4 LDY #3
  200 .loop5 LDA byte:ROL A:LDA
result,X
:ROL A:STA result,X:LDA byte:ROL A:STA
b
yte:LDA result,X:ROL A
  210 STA result,X:DEY:BPL
loop5:INX:CPX
 #2:BNE loop4:LDA result:RTS
  220 .name EQUS "G."
  230 .namest EQUD 0:EQUD 0
  240 .stack EQUD 0:EQUD 0
  250 .counter1 EQUB 200
  260 .counter2 BRK:.counter3 BRK
  270 .result EQUW 0:.temp EQUW 0
  280 .byte BRK:.channel BRK
  290 .data EQUD &00000604:EQUD
&3CC03CB
8:]:NEXT:ENDPROC
```

Elegant screen switcher

Author: Richard Carter
Language: 6502 code
Filename: ScrSwop

AN outstanding enhancement over the original BBC Micro on the B+, Master Series and Compact is the extra screen storage area in the form of shadow memory. With this the micro actually contains addresses &3000 to &7FFF in two separate places, each of which can store 20k of different information.

Due to this, it is therefore possible on these micros to hold two full Mode 0, 1 or 2 screens at once. However, switching directly between them is very rapid because all that is needed is the movement of a hardware latch.

However, by employing memory peeking and poking it is possible to use one bank of the available memory simply as a reserve, and quite literally swap bytes between the two. Add to this a stepped distance separating the bytes swapped each time, and the switch becomes much more elegant.

On the Master the area of memory that can be accessed is constantly changed during the process by altering bit 2 of the ACCCOM register (&FE34) to enable exchange of data between the two banks. Meanwhile the screen memory being displayed is kept the same. This does not work on the B+ because the register is different and only capable of writing to the area also selected for display.

To move a cells contents between maps, the process is:

- A byte is taken from the main map and stored in &74.
- The corresponding byte from the shadow map is moved into the main map.

The value in &74 is stored in the emptied shadow map location. It is possible to either increase or reduce the speed of the byte exchange by modifying lines 90 and 130. For example, try altering them to:

```
 90 LDA #&11:STA &72:STA &73
130 LDA #&10:STA &71:LDA #19
```

This allows the routine to be more flexible to your needs. Note that the value in line 90 should be higher than that in 130, and both should be at least in double figures, otherwise the screen may not switch in the desired way.

```
  10 REM Main/shadow screen byte swap
  20 REM by Richard Carter
  30 REM (c) The Micro User
  40 REM ------------------
  50 MODE 130:DIM code% &FF
  60 FOR pass=0 TO 2 STEP 2:P%=code%
  70 [OPT pass:.start LDX #0
  80 LDA #0:STA &70:LDA #&30:STA &71
  90 LDA #&4D:STA &72:STA &73
 100 .loop JSR swapscreen:CLC:LDA &70
 110 ADC &73:STA &70:BCC loop:INC &71
 120 LDA &71:CMP #&80:BNE loop
 130 LDA #&30:STA &71:LDA #19
 140 JSR &FFF4:DEC &72:LDA &72
 150 BNE loop:RTS
  160 .swapscreen LDA (&70,X):STA &74
  170 LDA &FE34:AND #2:CMP #2
  180 BEQ bitclear:SEC:LDA &FE34
  190 SBC #2:STA &FE34
  200 .bitclear LDA (&70,X):PHA
  210 LDA &74:STA (&70,X):CLC
  220 LDA &FE34:ADC #2:STA &FE34
  230 PLA:STA (&70,X):RTS:]:NEXT
  240 FOR t=1 TO 20:GCOL 3,RND(7):PLOT 8
5,RND(1279),RND(1023):NEXT:MODE 2
  250 FOR t=1 TO 20:GCOL 3,RND(7):PLOT 8
5,RND(1279),RND(1023):NEXT:VDU 23,1,0;0;
0;0;:REPEAT:CALL start:REPEAT UNTIL INKE
Y(500):UNTIL 0
```

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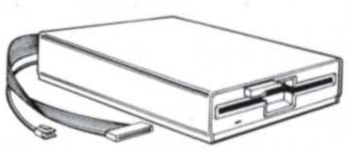

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• Prodot Cut Sheet Feeder	£120
• Swift 24 Colour Option	£32
• Swift 24 Ribbons Black **£4** Colour	£13

Star Printers

• **LC10** 9pin 80col. 144/36 CPS	£118
• **LC10-II** 9pin 80col. 180/45 CPS	£139
• **LC15** 9pin 136col. 180/45 CPS	£245
• **LC24-10** 24pin 80col. 180/60 CPS	£172
• **LC24-15** 24pin 136col. 200/67 CPS	£310
• **FR10** 9pin 300/76 CPS 31K 16 fonts	£275
• **FR15** Wide carriage version of above	£365
• **XB24-10** 24pin 80col. 240/80 CPS	£360
• **XB24-15** 24pin 80col. 240/80 CPS	£480
• **XB-24** Colour Kit	£35
• **LC-200** Colour 9pin 80col. 180/45 CPS	£160
• **LC-24-200** 24pin 80col. 222/67 CPS	£215
• **LC24-200** Colour 24pin 80col. 222/67 CPS	£230

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10	LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200	£49
8K Ser	LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15	£64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour	£29

Buffers

32K Ram Card for LC24-10; 15 & 200	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15	Black **£4;**	Colour **£6**
LC-200; LC24-200	Black **£5;**	Colour **£12**
XB24-10; XB24-15	Black **£5;**	Colour **£12**

Laser Printers

• Canon LBP-4	4ppm	£695
• Canon LBP-8 IIIR	8ppm	£1740
• Canon LBP IIIT	8ppm	£1580
• Epson EPL7100	6ppm	£735
• HP Laserjet IIP**	4ppm	£665
• HP Laserjet III	8ppm	£1199
• HP Laserjet IIID	8ppm	£1775
• Panasonic KX-P4420	8ppm	£699
• Panasonic KX-P4450i	11ppm	£1105
• Panasonic KX-4455 Postscript	11ppm	£1699
• Qume Crystal Print WP+		£749
• Qume Crystal Print Ser. 2		£1065
• Qume Crystal Print Publisher 2		£1899
• Star LP-8 III		£1089
• Star LP-8 Star(post)script		£1299

** Lower Paper Cassette Tray & Premier Collection Software, **FREE** with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2 & 4	£60	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£59
KX-P4420/50	£25		

Laser RAM Upgrades

HP Laser RAM		KX-P4420	1M £249
IIP & III 1MB	£99	KX-P4450i	1M £299
IIP & III 2MB	£125	KX-P4450i	2M £575
II & IID 1MB	£102	Star LP-8 1MB	£143
II & IID 2MB	£127	Star LP-8 2MB	£285
II & IID 4MB	£325	Star LP-8 4MB	£429
GQ5000 512k	£99		

Laser Drum & Developer

• Epson Drum	GQ5000 £129	EPL7100	£129
• Panasonic 4420 Drum	£69	Developer	£59
• Panasonic 4450 Drum	£99	Developer	£80
• Qume Drum	£76		

Jetpage Postscript Cartridge

for Laserjet II	£369	IID & III	£375

NEW – HP Laserjet

Various Font Cartridges	£69
Superset Font	£275

Epson Printers

DFX5000	£1105	LQ850+	£425
DFX8000	£2070	LQ860 Colour	£489
EX800	£405	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550	£69
EX800/FX800/850/LQ800/850	£130
FX/LQ 1000/1050/SQ850	£159
LQ 2550 £390 SQ2550	£176

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

• EX800/1000 Colour Option	£45
• EX800/1000 Colour Ribbon	£14
• LQ2500 Colour Option	£65
• Multifont Card for LQ550/850/1050	£95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

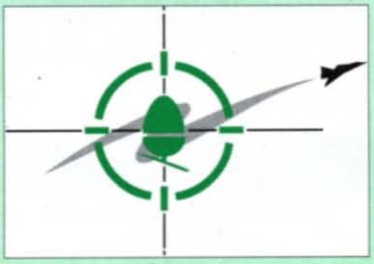
Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Special Offers this month

Canon BJ 10E Printer	£239
HP Deskjet 500 Printer	£349
Panasonic KX-P1124 Printer	£180
Philips CM8833-II Monitor	£172
TAXAN 795 Trinitron	£459
Wapping Editor + Mouse	£79

Take the Acorn Archimedes Test Flight and win yourself a Supersonic Concorde Flight



Take the new Archimedes 420/1 Learning system home by booking a slot in Watford's Acorn approved Test Schedule. Call in at our showroom and check it out for yourself – Leave a deposit and you may borrow one of our specially chosen Learning Curve System for up to 14 days. Be satisfied before you buy. Return the system in good order for a complete refund. At the same time you may enter our FREE aviator competition. You could win stunning prizes; Fly in First Class Luxury in Concorde; Learn to fly a helicopter' Take a weekend of flying lessons; and many more prizes. So why not take a test fly at Watford.

For Archimedes Mk II Hand Scanner, Real Time Digitiser, Graphics Tablet, Software & Books, see pages 5, 8, 10 & 12 of our advert.

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£36	£32	£4

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18;** Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

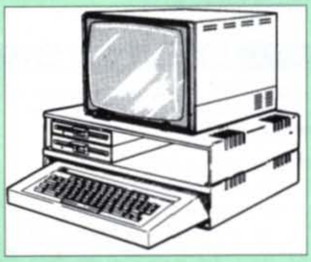
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

• 2 In/2 out	£135	• 4 In/2 out	£169
• 8 In/1 out	£199		

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

Plinths for the BBC B & Master 128K Micros

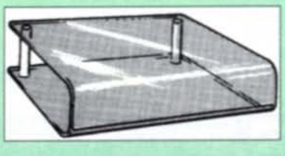


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

VISA

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

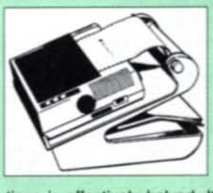
Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£8
P115 for KX-P1180/P1624	£8
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9.95 each**

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser

Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)
(Now, fully LinCAD compatible. Recommended by Linear Graphic).

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	**£16.00**
• Watford DFS Kit complete	**£69.00**
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	**£12.00**
• DFS Manual (comprehensive)	**£6.95**
• Acorn DNFS ROM	**£17.00**
• Acorn ADFS ROM only	**£25.00**
• Acorn 1772 DFS ROM Kit	**£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	**£44.00**
• DDFS Manual	(No VAT) **£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	***£5***
• *10 x 5.25" D/S D/D 40T (745)*	***£5***
• *10 x 5.25" S/S D/D 80 Track (746)*	***£7***
• *10 x 5.25" D/S D/D 80 Track (747)*	***£7***
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	***£11***
• *10 x 3.25" S/S D/D 40/80 Track*	***£7***
• *10 x 3.25" D/S D/D 40/80 Track*	***£8***
• *10 x 3.5" Double Sided High Density*	***£15***

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 x **M3** 3.5" D/S D/D 80 Track*	***£7***
● *10 x **M9** 3.5" D/S High Density*	***£14***
● *10 x **M4** 5.25" S/S D/D 40 Track*	***£5***
● *10 x **M5** 5.25" D/S D/D 40 Track*	***£5***
● *10 x **M7** 5.25" D/S D/D 80 Track*	***£7***
● *10 x **M8** 5.25" D/S H/D Hi-Density*	***£11***
● ***M2** 3" Double Sided*	***£2.50** each*

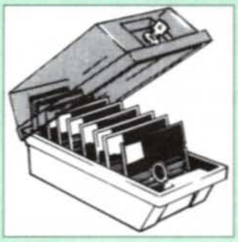
CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

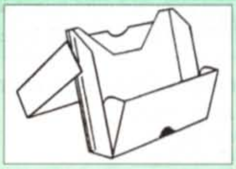


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

• **M35** – holds up to 50 5.25" discs	**£4.95**
• **M85** – holds up to 95 5.25" discs	**£6.95**
• **M25*** – holds up to 25 3.5" discs	**£4.95**
• **M50** – holds 50 3.5" discs	**£6.50**
• **M10** – holds 8 of No. 10 Data Cartridges	**£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs.	**£1.50**
Holds up to 10 x 5.25" Discs.	**£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	**S-S 40T**	**D-S 40T**	**D-S 80T**
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50	£52 for 100	

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below. The tinting of the boxes indicates 40/80 track switchable disc drives. For ease of use, the switches are mounted on the front panel.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

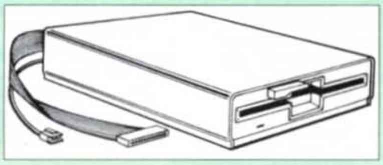
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

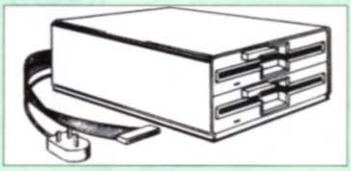
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS 400S £72		CS 400S £82	
800K (1,44M		CLD 800S £142		CD 800S £159

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £6 to £7

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

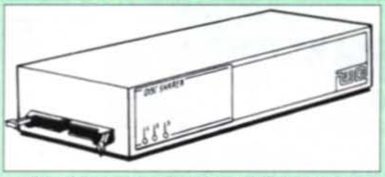
• CLS35 400K Unit	**£62**	**• CLD35 Twin 800K**	**£109**

Drives with built-in Power Supply Unit

• CS35 Single 400K	**£84**	**• CD35 Twin 800K**	**£126**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

DISC DRIVE SHARER

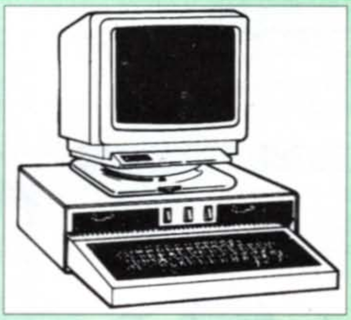


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables Offer Price : **£55**

CDPM 800S DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £165

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £154

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

• Quest Mouse II & Quest Paint	£58
• Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
• Quest Mouse II only	£29
• Quest Paint Software only	£34
• Quest Font Disc (22 Text Fonts)	£15
• Quest Mouse Mat (Red or Blue or Green please specify)	£3
• Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer	£18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

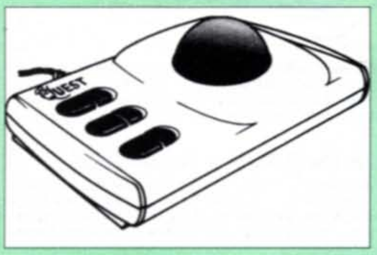
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	**£27**
QT-20 Archimedes Version	**£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

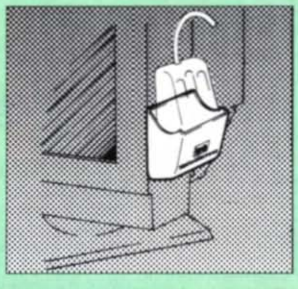
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

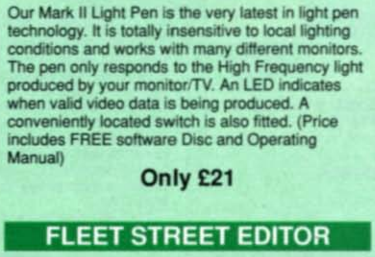
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.

It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

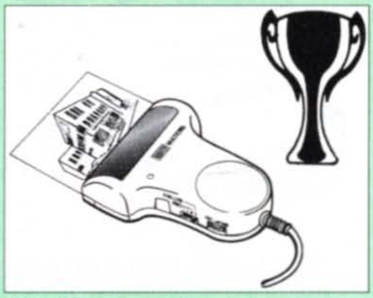
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW

At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

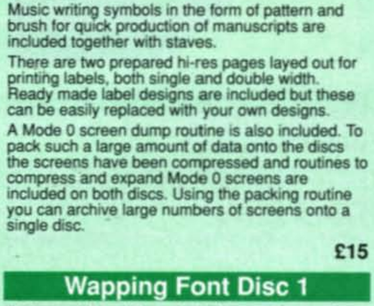
Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions. **£12**

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only). **£13**

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

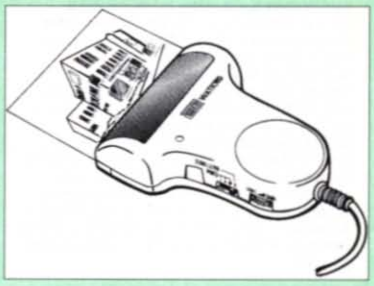
Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer	**£325**
LPB4 Printer plus High Res Card	**£1025**

(For demonstration, call in at our retail shop)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

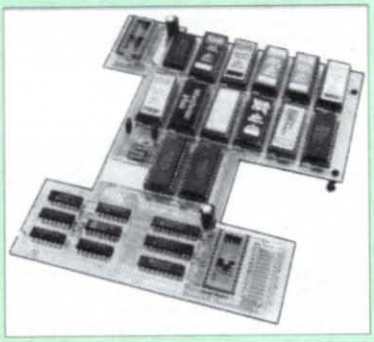
AHS-4 Archi 300/400 Version	**£149**
AHS-3 Archi A3000 Version	**£175**

Continued→ → → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

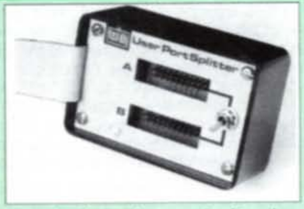
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

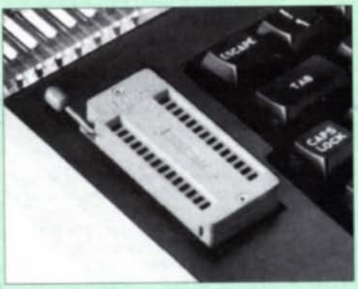
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	**£11**
• Spare Cartridges	**£2.75**
• Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

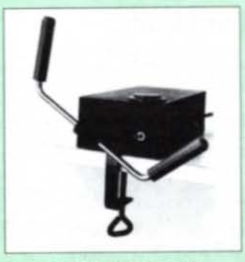
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card

Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

ROM/RAM card with 32k dynamic RAM	**£48**
ROM/RAM card with 64k dynamic RAM	**£65**
ROM/RAM card with a massive 128k dynamic RAM	**£109**

(carriage on ROM-RAM Card £3)

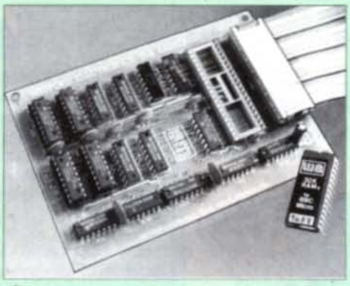
OPTIONAL EXTRAS:

16k plug-in Static RAM kit	**£9**
16k Dynamic RAM for Upgrade	**£13**
Battery backup	**£3**
Read and Write protect switches	**£2 each**
Complete ROM-RAM board All options installed	**£115**

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
ECOLOGY O-Level program.	£20.00
POLYMERS O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Computers at Work – Primary	£17.35
Introducing Geography 11-17 years	£17.50
Electric Fields 6-14 years	£11.25
Espana Viva – 3 Discs	£19.95
WHITE KNIGHT Chess game	£16.00
A Vous La France	£29.00

More Educational Software

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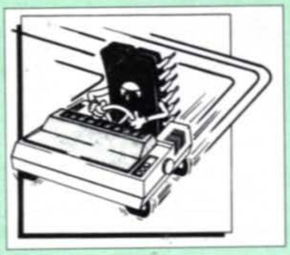
VIEW PRINTER DRIVER ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

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Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

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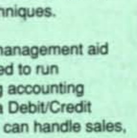

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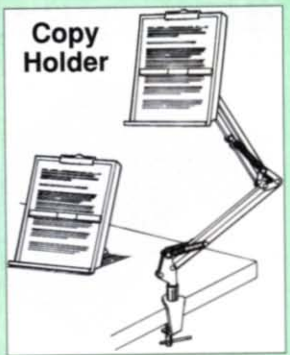

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'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

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The Complete BBC Computer User Handbook

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Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

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Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

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(Please write in for technical literature)

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It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

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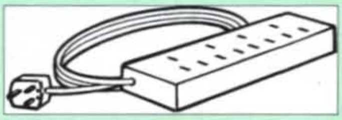

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Computer Shopper Jan. 1991

Specifications

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Display:	Electro-luminescent (EL) backlit transflective supertwist LCD – 80 x 25 characters – 640 x 200 bit mapped IBM CGA compatible
Keyboard:	Full size Qwerty layout, Integrated Numeric Keypad
Power:	Internal NiCad battery – Battery Charge Indicator – Mains Adaptor provided supplies 9-15V DC External 12V DC
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Accessories:	Internal Removable NiCad Battery Pack – AC Mains Adaptor/Charger
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A Way With Words

Gordon Lethbridge expands his number worksheets to cover language

PROGRAMS that can generate maths worksheets for children are fairly easy to design and several were published in the January issue of *The Micro User*. These adaptable routines could even produce problems of the "If two taps fill a bath..." variety.

So if you can do this for maths can it be done for language/spelling worksheets?

Yes it can, and the listings given here provide a very versatile approach that will serve your needs in many different areas.

There are two programs: MakeFil and WorkOut. With the first you create the word lists and specify what you want to do with them – insert blanks for letters or convert to singular

The second takes the data file and creates the actual worksheet – you can control the number of copies produced and how many lines on each copy.

The worksheets have a standard layout so that the answers can be folded to the back so they can be checked easily as the child fills them in.

First enter MakeFil, ensure you've made no typing errors using the checksums, and then save it.

When run you are presented with a menu of nine options: The first two, Load and Save are self-explanatory as is the last – Quit.

Set File Type refers to how the words are to be treated, currently there are three options: *Replace* allows you to substitute blanks for certain sequences of letters within the word list. Menu options six and seven allow you to enter the letter seqences.

Magic E also performs a replace but only on one letter within a word which has a magic "e" ending – the word list must contain only magic e words.

The file type *Plurals* expects every word in the list to be in its plural form, it is then converted to singular by the WorkOut program.

Creating the word list – or letter sequences – is very easy: Choose the Edit option, the first time you will be presented with *** which is the end of list marker. Press Return and you can now edit and enter your word. Pressing Return again stores the word in the list and moves on to the next word – which if you are adding will be *** again.

You can move around the list using the up and down arrow keys. To alter a word you've already entered just move through the list until you find it, then press Return. You can now edit as before.

You can save the file as you go along, but ensure you select the correct type before you run the WorkOut program.

When creating a file it is good to have a list of 40 or more words otherwise there will be too much repetition on the worksheet. You can print out the list to check for mistakes or create another one.

The second program, WorkOut, prints the worksheets in accordance with the file type you selected. Enter this one and check for typing errors using the checksums, then save it.

When run, WorkOut presents a short menu with four entries – Load, Options, Print and Quit.

You can elect whether to print out more than one copy and how many words on each copy you want.

Further developments

It is possible to use the same initial format and develop the program for other uses. You could, for instance, make up files of other letter combinations – since the program is driven completely from the data provided all you do is enter a word list with different letter sequences and select file type *Replace*.

You can create your own file types fairly easily and add them to those that already exist. For example to create worksheets that teach opposites first you must choose a format. Let's say you create the list with each word followed by it's opposite.

First you need to change MakeFil. Alter the number of types in line 490 to four and add the new type name to the end of line 500. No other changes are needed and you can now save it, run it and simply type in the alternating list.

Next run WorkOut and try loading the file you created – perhaps called Oppi. You'll find an error is generated and you won't be able to load it.

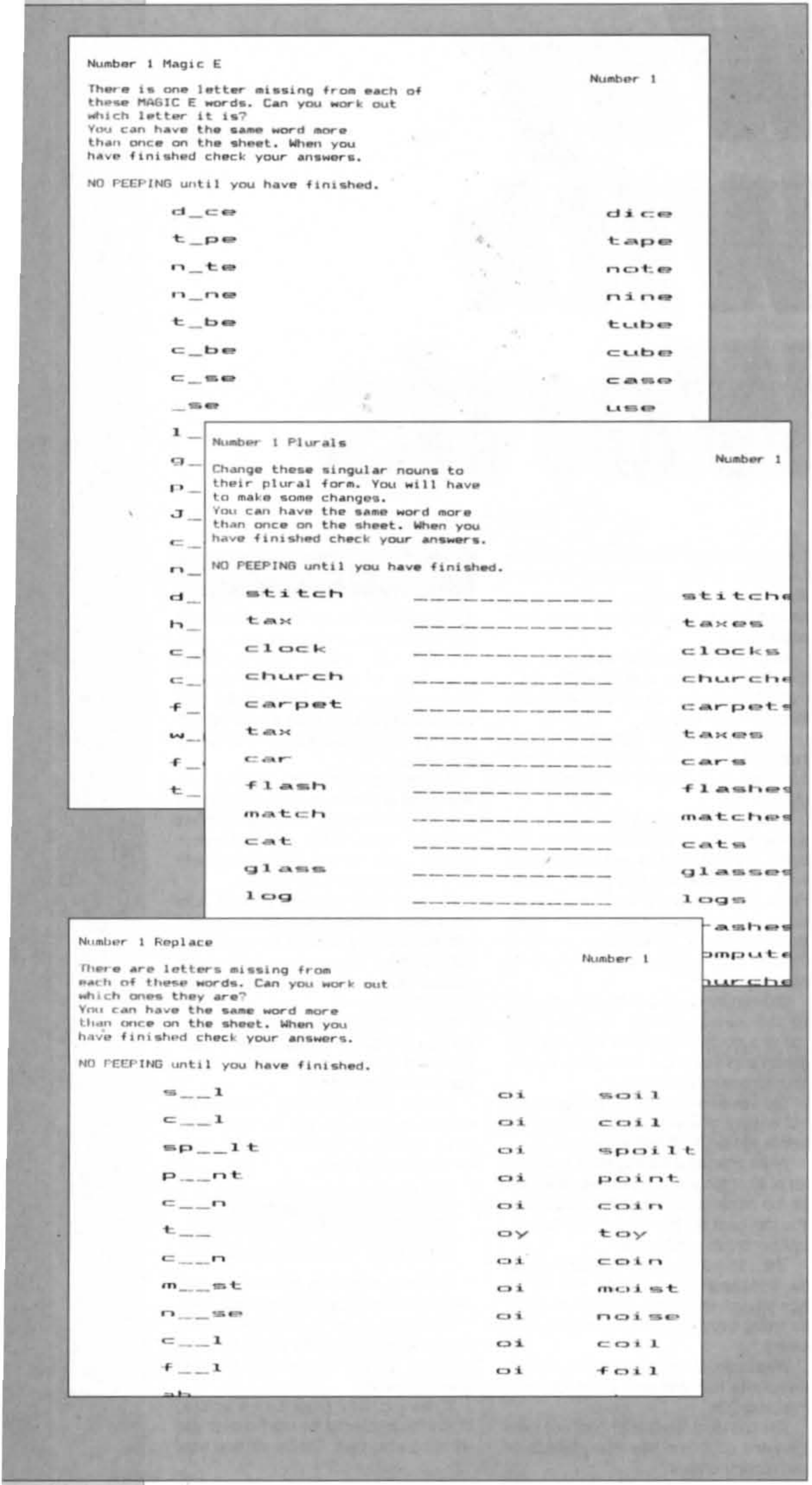
So now modify WorkOut – change the number of types and add the type name, as for MakeFil, in lines 430 and 440. Next add the following lines:

```
1615 IF type=4 PROCoppose
1735 IF type=4 t1$="...":t2$="..."
:t3$="..."
```

The dots need to be replaced by messages similar to those in the previous lines.

Finally you have to create the procedures that will select the words and print the lines. You can use those for the other types as models.

When your new procedure is entered *W%* is the number of the word chosen and *w$* is the word itself. The list starts at word



Number 1 Magic E

Number 1

There is one letter missing from each of
these MAGIC E words. Can you work out
which letter it is?
You can have the same word more
than once on the sheet. When you
have finished check your answers.

NO PEEPING until you have finished.

d_ce	dice
t_pe	tape
n_te	note
n_ne	nine
t_be	tube
c_be	cube
c_se	case
_se	use
l_	
g_	
p_	
J_	
c_	
n_	
d_	
h_	
c_	
c_	
f_	
w_	
f_	
t_	

Number 1 Plurals

Number 1

Change these singular nouns to
their plural form. You will have
to make some changes.
You can have the same word more
than once on the sheet. When you
have finished check your answers.

NO PEEPING until you have finished.

stitch	____________	stitche
tax	____________	taxes
clock	____________	clocks
church	____________	churche
carpet	____________	carpets
tax	____________	taxes
car	____________	cars
flash	____________	flashes
match	____________	matches
cat	____________	cats
glass	____________	glasses
log	____________	logs
		ashes
		ompute
		hurche

Number 1 Replace

Number 1

There are letters missing from
each of these words. Can you work out
which ones they are?
You can have the same word more
than once on the sheet. When you
have finished check your answers.

NO PEEPING until you have finished.

s__l	oi	soil
c__l	oi	coil
sp__lt	oi	spoilt
p__nt	oi	point
c__n	oi	coin
t__	oy	toy
c__n	oi	coin
m__st	oi	moist
n__se	oi	noise
c__l	oi	coil
f__l	oi	foil
ab		

➤

one, so you can work out that if *W%* is odd its associated opposite is at *W%+1* and if it's even the opposite is at *W%-1*. We can use *MOD* to discover if *W%* is odd or even because it gives the remainder.

Starting right from the end of the program at line 2140 the procedure could be:

```
DEF PROCopposite
IF W%MOD2=1 q$=word$(W%+1)
IF W%MOD2=0 q$=word$(W%-1)
p$=STRING$(12," ")
PRINTTAB(6)w$TAB(15)p$TAB(30)w$
ENDPROC
```

Another method along this line is for teaching opposites with prefixes such as dis-, un- and im- or practising suffixes such as -ing, -ly, or -ed.

There are a number of files on this month's subscription disc to use with the two programs covering two vowel replacement, magic R words and plurals.

Listing I:

```
 10 REM Make Word File
 20 REM by Gordon Lethbridge
 30 REM (c) The Micro User
 40 MODE7
 50 PROCinit
 60 ON ERROR PROCerror
 70 REPEAT
 80 O%=FNmenu
 90 IF O%<opts% PROChead(opt$(O%,1))
100 quit=EVAL("FN"+opt$(O%,2))
110 UNTIL quit
120 PROCquit
130 END
140 DEF PROCinit:PROCoff:*FX4,1
150 maxwords=100:numwords=0
160 DIM word$(maxwords+1):null$="***"
170 maxrepls=5:numrepls=0
180 DIM repl$(maxrepls+1)
190 currepl=1:curword=1
200 READ opts%:DIM opt$(opts%,2)
210 FOR O%=1 TO opts%
220 READ opt$(O%,1),opt$(O%,2)
230 opts$=opts$+STR$O%:NEXT
240 READ types:DIM type$(types)
250 FOR T%=1 TO types
260 READ type$(T%):NEXT:type=1
270 of$="":F%=0:temp$="temp"
280 DIM f%256:osfind=&FFCE
290 E%=0:osbyte=&FFF4:oscli=&FFF7
300 lo$="abcdefghijklmnopqrstuvwxyz"
310 hi$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
320 alf$=lo$+hi$:num$="0123456789"
330 punc$="!#$%&()=-^|@:."
340 all$=alf$+num$+punc$
350 dl$=CHR$127:cr$=CHR$13
360 PROCwindow(0):edited=FALSE
370 cursor$=CHR$&8B+CHR$&8A+cr$+dl$
380 ENDPROC
390 DATA 9
400 DATA Save words,save
410 DATA Load words,load
420 DATA Set file type,settype
430 DATA Edit words,editw
440 DATA Clear words,clearw
450 DATA Print words,print
460 DATA Edit replacements,editr
470 DATA Clear replacements,clearr
480 DATA Quit,quit
```

➤

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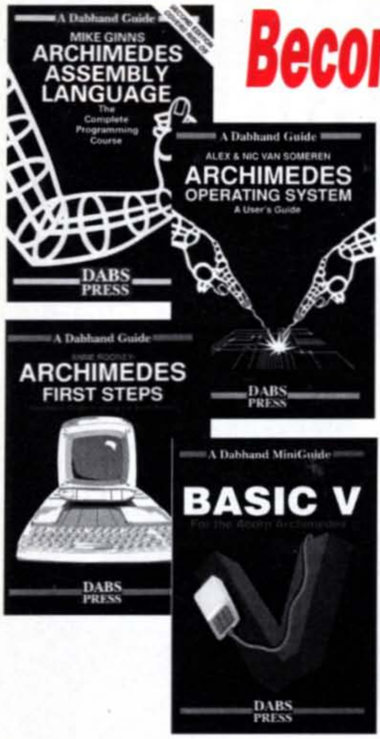
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```
490 DATA 3
500 DATA Replace,Magic E,Plurals
510 DEF PROCoff
520 VDU23,1,0;0;0;0;0;:ENDPROC
530 DEF PROCon
540 VDU23,1,1;0;0;0;0;:ENDPROC
550 DEF PROCerror
560 PROCoff:F%=FNclose(F%)
570 IF ERR=17 AND E%>0 E%=0:PROCmessage(e$):Z%=FNin(" ")
580 IF ERR=17 AND E%=0 ENDPROC
590 ON ERROR OFF:PROCquit
600 REPORT:PRINT" at ";ERL
610 END
620 DEF PROCmessage(m$):VDU7
630 PROCwindow(2):PROCcn(m$,1):ENDPROC
640 DEF PROCos($f%):LOCAL X%,Y%
650 X%=f%:Y%=X%DIV256:CALLoscli
660 ENDPROC
670 DEF PROCwindow(W%)
680 IF W%=0 lx%=0:by%=24:rx%=39:ty%=0
690 IF W%=1 lx%=3:by%=21:rx%=36:ty%=2
700 IF W%=2 lx%=3:by%=24:rx%=36:ty%=22
710 VDU28lx%by%rx%ty%12:ENDPROC
720 DEF FNclose(F%)
730 IF F%<>0 CLOSE#F%:F%=0
740 =F%
```

SUBSCRIBE NOW!
If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

```
750 DEF FNopenout($f%)
760 LOCAL A%,X%,Y%
770 X%=f%:Y%=X%DIV256
780 A%=&80:=USR(osfind)AND&FF
790 DEF FNopenin($f%)
800 LOCAL A%,X%,Y%:X%=f%
810 Y%=X%DIV256:A%=&40
820 =USR(osfind)AND&FF
830 DEF PROCdelete(f$)
840 LOCAL F%:F%=FNopenin(f$)
850 IF F%=0 ENDPROC
860 F%=FNclose(F%)
870 PROCos("DELETE "+f$)
880 ENDPROC
890 DEF PROCrename(f$,t$)
900 PROCos("RENAME "+f$+" "+t$)
910 ENDPROC
920 DEF FNfilename(t$,Y%)
930 PRINTTAB(10,Y%)t$" : "
940 of$=FNstring(of$,8,Y%+2,20)
950 =of$
960 DEF FNstring(s$,X%,Y%,L%)
970 LOCAL I%,P%,a$:P%=LENs$
980 VDU31X%+L%+2Y%,156
990 VDU31X%-3Y%,132,157,131
1000 PRINTSPCL%TAB(X%,Y%)s$;
1010 REPEAT a$=all$
1020 IF P%>0 a$=a$+dl$+cr$
1030 IF P%=L% a$=dl$+cr$
1040 i$=MID$(a$,FNin(a$),1)
1050 IF i$=dl$ VDU127:P%=P%-1:s$=LEFT$(s$,P%) ELSEIF i$<>cr$ PRINTi$;:s$=s$+i$:P%=P%+1
1060 UNTIL i$=cr$:=s$
1070 DEF PROCgenError(e$):E%=99
1080 A%=125:CALLosbyte:ENDPROC
1090 DEF PROCquit:*FX4
1100 PROCon:VDU26,12:ENDPROC
1110 DEF FNmenu:LOCAL O%,o$
1120 PROChead("Make File")
1130 FOR O%=1 TO opts%:o$=""
1140 IF opt$(O%,2)="settype" o$="("+type$(type)+")"
1150 IF opt$(O%,2)="editw" o$="("+STR$numwords+")"
1160 IF opt$(O%,2)="editr" o$="("+STR$numrepls+")"
1170 PROCout(O%,6,O%*2-1,o$):NEXT
1180 PRINT'SPC10"Enter choice";
1190 =FNin(opts$)
1200 DEF PROChead(t$)
1210 PROCwindow(0)
1220 LOCAL L%:FOR L%=0 TO 1
1230 VDU31,0,L%,132,157,131
1240 NEXT:PROCdb(t$,0)
1250 FOR L%=22 TO 24
1260 VDU31,0,L%,132,157,131
1270 NEXT:PROCwindow(1):ENDPROC
1280 DEF PROCdb(t$,Y%)
1290 PROCcn(CHR$141+t$+" ",Y%)
1300 PROCcn(CHR$141+t$+" ",Y%+1)
1310 ENDPROC
1320 DEF PROCcn(t$,Y%)
1330 PRINTTAB((rx%-lx%-LENt$)/2,Y%)t$;
1340 ENDPROC
1350 DEF PROCout(O%,X%,Y%,o$)
1360 LOCAL t$:t$=CHR$129+STR$O%+"."
1370 t$=t$+CHR$134+opt$(O%,1)
1380 PRINTTAB(X%,Y%)t$CHR$135o$
1390 ENDPROC
1400 DEF FNin(k$)
1410 LOCAL I%:REPEAT PROCon
1420 I%=INSTR(k$,GET$):PROCoff
1430 VDU-7*(I%=0):UNTIL I%>0
1440 shift%=INKEY-1:=I%
1450 DEF PROCsure:VDU7
1460 PROCmessage("Are you sure? (y/n)")
1470 IF FNin("YyNn")>2 PROCgenError("Aborted")
1480 PROCwindow(2):ENDPROC
1490 DEF PROCnowords
1500 IF numwords=0 PROCgenError("No words")
1510 ENDPROC
1520 DEF PROCnorepls
1530 IF numrepls=0 PROCgenError("No replacements")
1540 ENDPROC
1550 DEF FNsave
1560 LOCAL L%,f$:PROCnowords
1570 f$=FNfilename("Save",3)
1580 F%=FNopenout(temp$)
1590 IF F%=0 PROCgenError("Can't open output file")
1600 PRINT#F%,type,numrepls,numwords
1610 FOR L%=1 TO numrepls
1620 PRINT#F%,repl$(L%):NEXT
1630 FOR L%=1 TO numwords
1640 PRINT#F%,word$(L%):NEXT
1650 F%=FNclose(F%):PROCdelete(f$)
```

```
1660 PROCrename(temp$,f$)
1670 PROCdelete(temp$)
1680 edited=FALSE:=0
1690 DEF FNload:LOCAL L%,f$
1700 IF edited PROCgenError("Unsaved data")
1710 f$=FNfilename("Load",3)
1720 F%=FNopenin(f$)
1730 IF F%=0 PROCgenError("Can't open input file")
1740 INPUT#F%,type,numrepls,numwords
1750 IF type>types PROCgenError("Unknown file type")
1760 IF numwords>maxwords PROCgenError("Too many words")
1770 IF numrepls>maxrepls PROCgenError("Too many replacements")
1780 FOR L%=1 TO numrepls
1790 INPUT#F%,repl$(L%):NEXT
1800 FOR L%=1 TO numwords
1810 INPUT#F%,word$(L%):NEXT
1820 F%=FNclose(F%):edited=FALSE
1830 curword=1:currepl=1:=0
1840 DEF FNsettype
1850 PRINTTAB(1,1)"Press space to increment"TAB(1,2)"and Return to select"
1860 REPEAT
1870 PRINTTAB(0,5)SPC80TAB(10,5)type$(type);
1880 type=type+1:IF type>types type=1
1890 UNTIL FNin(cr$+" ")=1
1900 type=type-1:IF type=0 type=types
1910 =0
1920 DEF FNeditw
1930 REPEAT PROCwindow(1)
1940 PRINTTAB(1,1)"Use arrow keys to select a word"TAB(1,2)"and Return to edit it"
1950 word$(numwords+1)=null$
1960 PRINTTAB(1,5)"Word ";curword" of ";numwords" = "word$(curword);
1970 I%=FNin(cursor$)
1980 IF I%=1 curword=curword-1
1990 IF curword=0 curword=numwords+1
2000 IF I%=2 curword=curword+1
2010 IF curword=numwords+2 curword=1
2020 IF I%=3 PROCeditword(curword)
2030 IF I%=4 PROCdeleteword(curword)
2040 UNTIL FALSE:=0
2050 DEF PROCeditword(W%)
2060 IF numwords=maxwords PROCgenError("No more allowed")
2070 w$=FNstring(word$(W%),8,7,20)
2080 IF word$(W%)=null$ numwords=numwords+1
2090 word$(W%)=w$:curword=curword+1
2100 edited=TRUE:ENDPROC
2110 DEF PROCdeleteword(W%)
2120 LOCAL L%:PROCnowords
2130 IF curword=numwords+1 PROCgenError("Can't delete marker")
2140 PROCsure:edited=TRUE
2150 FOR L%=curword TO numwords
2160 word$(L%)=word$(L%+1):NEXT
2170 numwords=numwords-1:ENDPROC
2180 DEF FNclearw:IF edited PROCsure
2190 numwords=0:=0
2200 DEF FNprint:PROCnowords
2210 PROCmessage("Ready printer...")
2220 Z%=FNin(" "):*FX3,10
2230 FOR L%=1 TO numwords
2240 PRINTL%SPC6word$(L%):NEXT:*FX3,4
2250 =0
2260 DEF FNeditr
2270 REPEAT PROCwindow(1)
2280 PRINTTAB(1,1)"Use arrow keys to select"
2290 PRINTTAB(1,2)"and RETURN to edit"
```

➤

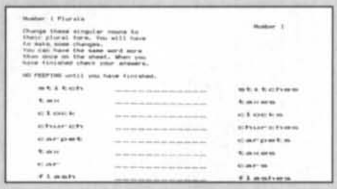
```
2300 repl$(numrepls+1)=null$
2310 PRINTTAB(1,5)"Word ";currepl" of "
;numrepls" = "repl$(currepl);
2320 I%=FNin(cursor$)
2330 IF I%=1 currepl=currepl-1
2340 IF currepl=0 currepl=numrepls+1
2350 IF I%=2 currepl=currepl+1
2360 IF currepl=numrepls+2 currepl=1
2370 IF I%=3 PROCeditrepl(currepl)
2380 IF I%=4 PROCdeleterepl(currepl)
2390 UNTIL FALSE:=0
2400 DEF PROCeditrepl(R%)
2410 IF numrepls=maxrepls PROCgenError(
"No more allowed")
2420 w$=FNstring(repl$(R%),8,7,20)
2430 IF repl$(R%)=null$ numrepls=numrep
ls+1
2440 repl$(R%)=w$:currepl=currepl+1
2450 edited=TRUE:ENDPROC
2460 DEF PROCdeleterepl(R%)
2470 LOCAL L%:PROCnorepls
2480 IF currepl=numrepls+1 PROCgenError
("Can't delete marker")
2490 PROCsure:edited=TRUE
2500 FOR L%=currepl TO numrepls
2510 repl$(L%)=repl$(L%+1):NEXT
2520 numrepls=numrepls-1:ENDPROC
2530 DEF FNclearw:IF edited PROCsure
2540 numrepls=0:=0
2550 DEF FNquit:IF edited PROCsure
2560 =TRUE
```

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 8AFC C
  50 = DEBB A
  60 = 9621 F
  70 = BFBA 9
  80 = EC36 0
  90 = 4FD6 D
 100 = A5ED 2
 110 = 5FD3 7
 120 = F34D 3
 130 = FD2E E
 140 = 41BE 9
 150 = 565F D
 160 = 6E8A D
 170 = A83F 3
 180 = 12B8 C
 190 = A1E9 5
 200 = 39BD 9
 210 = AA7F F
 220 = B3D9 2
 230 = C38A F
 240 = 9386 1
 250 = D7EC 2
 260 = 66F9 E
 270 = 18F7 2
 280 = 965F 3
 290 = 3561 2
 300 = 4B98 3
 310 =  9D7 0
 320 = 856E 3
 330 = FCD1 E
 340 = 2CFF 1
 350 = CCCB F
 360 = 2C65 A
 370 = 459E 6
 380 = EDOF 1
 390 = B169 5
 400 = AAFB A
 410 = DAEB 4
 420 = D499 8
 430 = 13E8 F
 440 = 7EB5 8
 450 = 4022 8
 460 = BEE2 D
 470 = D352 C
 480 = 9DDC 6
 490 = 1023 4
 500 = CBA1 3
 510 = 8ADO E
 520 = EOBA D
 530 = 3A98 5
 540 = E3CF D
 550 = 72B4 3
 560 = F6F8 2
 570 = 36AD 9
 580 = B3DD 7
 590 = 561A 1
 600 = 752C 0
 610 = FD2E 8
 620 =  FDC 6
 630 = 1055 E
 640 = F557 D
 650 = C199 4
 660 = EDOF 1
 670 = 134E 6
 680 = 6E68 E
 690 = 395A F
 700 = B399 C
 710 = 3289 A
 720 = 1F7C 3
 730 = 3EA7 C
 740 = 5459 3
 750 = 43A0 B
 760 = ABF4 E
 770 = 3E56 C
 780 =  ED0 1
 790 = COA1 4
 800 = F3FF 2
 810 = B8C1 A
 820 = 2F64 C
 830 = EC9B 2
 840 = 9309 7
 850 = 2EE6 F
 860 = 81C3 C
 870 = 35E5 D
 880 = EDOF 3
 890 = D3DE B
 900 = F017 F
 910 = EDOF A
 920 = 5F09 6
 930 =  B54 1
 940 = BB9D D
 950 = 675F 4
 960 = A1B4 4
 970 = 41C4 0
 980 = 18F0 0
 990 = 426A 2
1000 =  EC1 C
1010 = E646 B
1020 =  426 6
1030 = C3E0 2
1040 = 5067 7
1050 = D699 A
1060 =  A7C A
1070 = DE37 7
1080 = AB1F 4
1090 = 3235 6
1100 = 63B0 2
1110 = 3746 C
1120 = 2FFF 2
1130 = D411 8
1140 = 7EEC 4
1150 = 2005 C
1160 = 4A12 E
1170 = E36A 3
1180 = 692E 9
1190 = 81E8 A
1200 = 4250 7
1210 =  311 8
1220 = B983 C
1230 =  CEC 0
1240 = E4F1 5
1250 = 91AA 4
1260 =  CEC 2
1270 = 1047 8
1280 = B786 0
1290 = 91A9 F
1300 = E296 5
1310 = EDOF D
1320 = 179A A
1330 = 110E 7
1340 = EDOF 3
1350 = 75C8 F
1360 = 6135 B
1370 = 117F D
1380 = 7455 E
1390 = EDOF 4
1400 = F5F7 C
1410 = BD19 B
1420 = EE1D A
1430 = BB3C C
1440 = 3E67 8
1450 = 4DE4 A
1460 = 1976 3
1470 = D5F1 A
1480 = BD7A F
1490 = 3CC1 3
1500 = E18D 2
1510 = EDOF B
1520 = 90F4 0
1530 = 82D9 A
1540 = EDOF A
1550 = D600 E
1560 = A7F9 5
1570 = 7593 E
1580 = EB47 4
1590 = E365 6
1600 = D9D4 4
1610 = F17B 8
1620 = FFDA 4
1630 = 5D4E 2
1640 = 3AA8 1
1650 = 6888 C
1660 = 37BC 3
1670 = 3B84 F
1680 = 8CDF F
1690 = 8C28 E
1700 = 1422 5
1710 = DBF9 3
1720 = A458 D
1730 = 574B 9
1740 = 21C3 8
1750 = 326A 6
1760 = 3DC7 C
1770 = 21CD 2
1780 = F17B 6
1790 = 6571 5
1800 = 5D4E 4
1810 = A003 6
1820 = ECF3 8
1830 = 4B04 B
1840 = 8AC6 0
1850 =  46D 4
1860 = BFBA 3
1870 = B98F 5
1880 = 4508 B
1890 =  7B9 6
1900 = DDFE A
1910 = 459A 2
1920 = 8F41 3
1930 = BAEA 3
1940 = 4D27 A
1950 = B2B9 1
1960 = C772 5
1970 = A810 3
1980 = BF37 9
1990 = BEA0 A
2000 = 6791 3
2010 = EF48 C
2020 = 97AC 2
2030 = 4086 8
2040 = E11F 3
2050 = 8FD1 4
2060 = F43D C
2070 = D4DB F
2080 = 4423 E
2090 = FB41 7
2100 = 8228 F
2110 = 9296 2
2120 = 6B61 D
2130 = 6607 5
2140 = AFF8 E
2150 = 4907 4
2160 = 3903 B
2170 = 5D3B E
2180 = 7352 4
2190 = 9F34 4
2200 = A3E2 E
2210 = F446 8
2220 = F061 4
2230 = 5D4E 7
2240 = 8903 3
2250 = 459A F
2260 = DFE4 4
2270 = BAEA C
2280 = 6104 4
2290 = 1DB6 9
2300 = 73E4 4
2310 = BDE6 6
2320 = A810 0
2330 = 5D6D 6
2340 = 2803 A
2350 = 85CB B
2360 = 1BD5 5
2370 = 8CED E
2380 = 5BC7 3
2390 = E11F A
2400 = 56BC 5
2410 = E10F 9
2420 = F9E1 6
2430 = 45C5 A
2440 = 3B55 A
2450 = 8228 C
2460 = 4BFB 8
2470 = C754 3
2480 = 14E5 9
2490 = AFF8 3
2500 = 5CBB B
2510 = EC16 C
2520 = 1744 7
2530 = 7352 D
2540 = AED7 8
2550 = 37A4 5
2560 = 453B 3
```

Listing II:

```
 10 REM Worksheet Workout
 20 REM by Gordon Lethbridge
 30 REM (c) The Micro User
 40 MODE7
 50 PROCinit
 60 ON ERROR PROCerror
 70 REPEAT
 80 O%=FNmenu
 90 IF O%<opts% PROChead(opt$(O%,1))
100 quit=EVAL("FN"+opt$(O%,2))
110 UNTIL quit
120 PROCquit
130 END
140 DEF PROCinit:PROCoff:*FX4,1
150 maxwords=100:numwords=0
160 DIM word$(maxwords+1)
170 maxrepls=5:numrepls=0
180 DIM repl$(maxrepls+1)
190 READ opts%:DIM opt$(opts%,2)
200 FOR O%=1 TO opts%
210 READ opt$(O%,1),opt$(O%,2)
220 opts$=opts$+STR$O%:NEXT
230 READ types:DIM type$(types)
240 FOR T%=1 TO types
250 READ type$(T%):NEXT:type=1
260 of$="":F%=0
270 DIM f%256:osfind=&FFCE
280 E%=0:osbyte=&FFF4:oscli=&FFF7
290 lo$="abcdefghijklmnopqrstuvwxyz"
300 hi$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
310 alf$=lo$+hi$:num$="0123456789"
320 punc$="!#$%&()=-^|@:."
330 vowel$="aeiou"
340 all$=alf$+num$+punc$
350 dl$=CHR$127:cr$=CHR$13
360 copies=1:lines=24
370 PROCwindow(0):ENDPROC
380 DATA 4
390 DATA Load words,load
400 DATA Set options,options
410 DATA Print worksheet,print
420 DATA Quit,quit
430 DATA 3
440 DATA Replace,Magic E,Plurals
450 DEF PROCoff
460 VDU23,1,0;0;0;0;:ENDPROC
470 DEF PROCon
480 VDU23,1,1;0;0;0;:ENDPROC
490 DEF PROCerror:*FX3,4
500 PROCoff:F%=FNclose(F%)
510 IF ERR=17 AND E%>0 E%=0:PROCmessag
e(e$):Z%=FNin(" ")
520 IF ERR=17 AND E%=0 ENDPROC
530 ON ERROR OFF:PROCquit
540 REPORT:PRINT" at ";ERL
550 END
560 DEF PROCmessage(m$):VDU7
570 PROCwindow(2):PROCcn(m$,1):ENDPROC
580 DEF PROCos($f%):LOCAL X%,Y%
```



```
590 X%=f%:Y%=X%DIV256:CALLoscli
600 ENDPROC
610 DEF PROCwindow(W%)
620 IF W%=0 lx%=0:by%=24:rx%=39:ty%=0
630 IF W%=1 lx%=3:by%=21:rx%=36:ty%=2
640 IF W%=2 lx%=3:by%=24:rx%=36:ty%=22
650 VDU28lx%by%rx%ty%12:ENDPROC
660 DEF FNclose(F%)
670 IF F%<>0 CLOSE#F%:F%=0
680 =F%
690 DEF FNopenin($f%)
700 LOCAL A%,X%,Y%:X%=f%
710 Y%=X%DIV256:A%=&40
720 =USR(osfind)AND&FF
730 DEF FNfilename(t$,Y%)
740 PRINTTAB(10,Y%)t$" : "
750 of$=FNstring(of$,8,Y%+2,20)
760 =of$
770 DEF FNnum(t$,N%,Y%)
780 PRINTTAB(8,Y%)t$" : ";
790 =VALFNstring(STR$N%,POS,VPOS,4)
```

```
  800 DEF FNstring(s$,X%,Y%,L%)
  810 LOCAL I%,P%,a$:P%=LENs$
  820 VDU31X%+L%+2Y%,156
  830 VDU31X%-3Y%,132,157,131
  840 PRINTSPCL%TAB(X%,Y%)s$;
  850 REPEAT a$=all$
  860 IF P%>0 a$=a$+dl$+cr$
  870 IF P%=L% a$=dl$+cr$
  880 i$=MID$(a$,FNin(a$),1)
  890 IF i$=dl$ VDU127:P%=P%-1:s$=LEFT$(
s$,P%) ELSEIF i$<>cr$ PRINTi$;:s$=s$+i$:
P%=P%+1
  900 UNTIL i$=cr$:=s$
  910 DEF PROCgenError(e$):E%=99
  920 A%=125:CALLosbyte:ENDPROC
  930 DEF PROCquit:*FX4
  940 PROCon:VDU26,12:ENDPROC
  950 DEF FNmenu:LOCAL O%
  960 PROChead("Worksheet Workout")
  970 FOR O%=1 TO opts%
  980 PROCout(O%,6,O%*2+1):NEXT
  990 PRINT'SPC10"Enter choice";
 1000 =FNin(opts$)
 1010 DEF PROChead(t$)
 1020 PROCwindow(0)
 1030 LOCAL L%:FOR L%=0 TO 1
 1040 VDU31,0,L%,132,157,131
 1050 NEXT:PROCdb(t$,0)
 1060 FOR L%=22 TO 24
 1070 VDU31,0,L%,132,157,131
 1080 NEXT:PROCwindow(1):ENDPROC
 1090 DEF PROCdb(t$,Y%)
 1100 PROCcn(CHR$141+t$+" ",Y%)
 1110 PROCcn(CHR$141+t$+" ",Y%+1)
 1120 ENDPROC
 1130 DEF PROCcn(t$,Y%)
 1140 PRINTTAB((rx%-lx%-LENt$)/2,Y%)t$;
 1150 ENDPROC
 1160 DEF PROCout(O%,X%,Y%)
 1170 LOCAL t$:t$=CHR$129+STR$O%+"."
 1180 t$=t$+CHR$134+opt$(O%,1)
 1190 PRINTTAB(X%,Y%)t$:ENDPROC
 1200 DEF FNin(k$)
 1210 LOCAL I%:REPEAT PROCon
 1220 I%=INSTR(k$,GET$):PROCoff
 1230 VDU-7*(I%=0):UNTIL I%>0
 1240 shift%=INKEY-1:=I%
 1250 DEF PROCsure:VDU7
 1260 PROCmessage("Are you sure? (y/n)")
 1270 IF FNin("YyNn")>2 PROCgenError("Ab
orted")
 1280 PROCwindow(2):ENDPROC
 1290 DEF FNload:LOCAL L%,f$
 1300 f$=FNfilename("Load",3)
 1310 F%=FNopenin(f$)
 1320 IF F%=0 PROCgenError("Can't open i
nput file")
 1330 INPUT#F%,type,numrepls,numwords
 1340 IF type>types PROCgenError("Unknow
n file type")
 1350 IF numwords>maxwords PROCgenError(
"Too many words")
 1360 IF numwords<2 PROCgenError("Not en
ough words")
 1370 IF numrepls>maxrepls PROCgenError(
"Too many replacements")
 1380 IF type=1 AND numrepls=0 PROCgenEr
ror("No replacements")
 1390 FOR L%=1 TO numrepls
 1400 INPUT#F%,repl$(L%):NEXT
 1410 FOR L%=1 TO numwords
 1420 INPUT#F%,word$(L%):NEXT
 1430 F%=FNclose(F%):=0
 1440 DEF FNoptions
 1450 copies=FNnum("Number of copies",co
pies,2)
 1460 lines=FNnum("Number of lines",line
s,4)
 1470 =0
 1480 DEF FNprint
 1490 PROCmessage("Ready printer...")
 1500 Z%=FNin(" "):Q%=TIME
 1510 FOR C%=1 TO copies
 1520 Z%=RND(-Q%):last%=-1
 1530 PROCmessage("Copy "+STR$C%+" of "+
STR$copies):*FX3,10
 1540 PROCheader(C%)
 1550 FOR L%=1 TO lines
 1560 PROCline:NEXT:VDU12:*FX3,4
 1570 NEXT:=0
 1580 DEF PROCheader(C%):LOCALt1$,t2$,t3
$
 1590 IF type=1 t1$="There are letters m
issing from":t2$="each of these words. C
an you work out":t3$="which ones they ar
e?"
 1600 IF type=2 t1$="There is one letter
 missing from each of":t2$="these MAGIC
E words. Can you work out":t3$="which le
tter it is?"
 1610 IF type=3 t1$="Change these singul
ar nouns to":t2$="their plural form. You
 will have":t3$="to make some changes."
 1620 PRINT"Number ";C%" "type$(type)TAB
(60)"Number ";C%
 1630 PRINTt1$'t2$'t3$
 1640 PRINT"You can have the same word m
ore"'"than once on the sheet. When you"'
"have finished check your answers."
 1650 PRINT'"NO PEEPING until you have f
inished."
 1660 PRINT:ENDPROC
 1670 DEF PROCline:VDU14
 1680 REPEAT W%=RND(numwords)
 1690 UNTIL W%<>last%:last%=W%
 1700 w$=word$(W%)
 1710 IF type=1 PROCreplace
 1720 IF type=2 PROCmagic_e
 1730 IF type=3 PROCplurals
 1740 VDU20:ENDPROC
 1750 DEF PROCreplace
 1760 REPEAT
 1770 IF numrepls=1 K%=1 ELSEK%=RND(numr
epls)
 1780 found=TRUE:p$=repl$(K%)
 1790 q$=FNdoReplace(w$,p$)
 1800 UNTIL found
 1810 PRINTTAB(5)q$TAB(25)p$TAB(31)w$'
 1820 ENDPROC
 1830 DEF FNdoReplace(w$,p$)
 1840 LOCAL P%,a$,b$:P%=INSTR(w$,p$)
 1850 IF P%=0 found=FALSE:=""
 1860 a$=LEFT$(w$,P%-1)
 1870 b$=MID$(w$,P%+LENp$)
 1880 =a$+STRING$(LENp$,"_")+b$
 1890 DEF PROCmagic_e:K%=LENw$
 1900 REPEAT K%=K%-1
 1910 UNTIL INSTR(vowel$,MID$(w$,K%,1))
 1920 a$=LEFT$(w$,K%-1)
 1930 b$=MID$(w$,K%+1)
 1940 PRINTTAB(5)a$"_"b$TAB(31)w$'
 1950 ENDPROC
 1960 DEF PROCplurals:K%=LENw$
 1970 b$=RIGHT$(w$,3):q$=""
 1980 IF b$="xes" OR b$="ses" OR b$="hes
" OR b$="oes" q$=FNplur1
 1990 IF b$="ves" q$=FNplur2
 2000 IF b$="ies" q$=FNplur3
 2010 IF q$="" q$=FNplurX
 2020 IF q$="" q$=FNplur4
 2030 p$=STRING$(12,"_")
 2040 PRINTTAB(2)q$TAB(12)p$TAB(28)w$'
 2050 ENDPROC
 2060 DEF FNplur1=LEFT$(w$,K%-2)
 2070 DEF FNplur2=LEFT$(w$,K%-3)+"f"
 2080 DEF FNplur3=LEFT$(w$,K%-3)+"y"
 2090 DEF FNplur4=LEFT$(w$,K%-1)
 2100 DEF FNplurX
 2110 IF w$="sheep" =w$
 2120 =""
 2130 DEF FNquit=TRUE
```

All program listings in this issue can be downloaded FREE on...
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```
                                 590 = C199 0    900 =  A7C E   1210 = BD19 7   1520 = 508F 6   1830 = 1294 8
                                 600 = ED0F 5    910 = DE37 0   1220 = EE1D 8   1530 = CB83 C   1840 = DB34 A
  10 =    0 0    300 =  9D7 B    610 = 134E 1    920 = AB1F A   1230 = BB3C 9   1540 = 5BBD C   1850 = FCEF F
  20 =    0 0    310 = 856E C    620 = 6E68 F    930 = 3235 9   1240 = 3E67 5   1550 = BEA6 2   1860 = B1ED 7
  30 =    0 0    320 = FCD1 1    630 = 395A E    940 = 63B0 B   1250 = 4DE4 2   1560 = 96A9 F   1870 = 65BA D
  40 = 8AFC C    330 = 61C7 A    640 = B399 4    950 = 2223 0   1260 = 1976 F   1570 = FA92 4   1880 = 2D0B A
  50 = DEBB A    340 = 2CFF C    650 = 3289 1    960 = BAAC 7   1270 = D5F1 2   1580 = 5828 1   1890 = 628D 7
  60 = 9621 F    350 = CCCB F    660 = 1F7C A    970 = AA7F 3   1280 = BD7A E   1590 = 642E A   1900 = 9EEE 8
  70 = BFBA 9    360 =  8A5 F    670 = 3EA7 3    980 = A2BC 1   1290 = 8C28 5   1600 = 8CDD A   1910 = 6555 6
  80 = EC36 0    370 = 5012 6    680 = 5459 A    990 = 692E 5   1300 = DBF9 C   1610 = AA10 A   1920 = 5948 B
  90 = 4FD6 D    380 = 60C4 9    690 = C0A1 8   1000 = 81E8 F   1310 = A458 9   1620 = 42EF F   1930 =  554 A
 100 = A5ED 2    390 = DAEB C    700 = F3FF C   1010 = 4250 9   1320 = 574B 9   1630 = B45E 2   1940 = 46EF B
 110 = 5FD3 7    400 = 3072 7    710 = B8C1 4   1020 =  311 B   1330 = 21C3 6   1640 =  1A0 7   1950 = ED0F 3
 120 = F34D 3    410 = 9D9E 7    720 = 2F64 6   1030 = B983 6   1340 = 326A D   1650 = 5AB9 0   1960 = 8601 6
 130 = FD2E E    420 = 9DDC 1    730 = 5F09 C   1040 =  CEC 0   1350 = 3DC7 8   1660 = D333 4   1970 = 4433 8
 140 = 41BE 9    430 = 1023 0    740 =  B54 6   1050 = E4F1 6   1360 = 1C96 C   1670 = 3119 0   1980 = E572 2
 150 = 565F D    440 = CBA1 8    750 = BB9D 3   1060 = 91AA 1   1370 = 21CD A   1680 = 4E1A 5   1990 = 3A80 A
 160 = 8411 0    450 = 8AD0 3    760 = 675F B   1070 =  CEC 0   1380 = 105B E   1690 = 6ADB 3   2000 = 773B A
 170 = A83F 3    460 = E0BA 3    770 = B156 C   1080 = 1047 1   1390 = F17B A   1700 =  56E 4   2010 = 71D8 2
 180 = 12B8 3    470 = 3A98 3    780 = 7713 F   1090 = B786 4   1400 = 6571 8   1710 = 9043 A   2020 = DCF2 7
 190 = 39BD 5    480 = E3CF 2    790 = F9AA A   1100 = 91A9 D   1410 = 5D4E E   1720 = 6BEC D   2030 = 3A0E 5
 200 = AA7F 8    490 = 85FA 7    800 = A1B4 6   1110 = E296 9   1420 = A003 6   1730 = 9EAB A   2040 = F72B B
 210 = B3D9 2    500 = F6F8 9    810 = 41C4 B   1120 = ED0F 9   1430 =  893 3   1740 = 5D80 1   2050 = ED0F 5
 220 = C38A 8    510 = 36AD 6    820 = 18F0 2   1130 = 179A 4   1440 = 373A 1   1750 = D288 E   2060 = 773F C
 230 = 9386 4    520 = B3DD 6    830 = 426A 0   1140 = 110E A   1450 = F73D 5   1760 = BFBA C   2070 = 3812 F
 240 = D7EC E    530 = 561A E    840 =  EC1 E   1150 = ED0F E   1460 = 42AA 2   1770 =  6D8 4   2080 = 85A3 8
 250 = 66F9 7    540 = 752C E    850 = E646 6   1160 = 1DEF 9   1470 = 459A 9   1780 = 9DBC 5   2090 = AB62 D
 260 = ED2B 8    550 = FD2E 9    860 =  426 8   1170 = 6135 5   1480 = 48A9 3   1790 = 69C2 1   2100 = 64A6 E
 270 = 965F B    560 =  FDC 9    870 = C3E0 D   1180 = 117F 7   1490 = F446 1   1800 = 9E00 E   2110 = A5A4 8
 280 = 3561 F    570 = 1055 D    880 = 5067 8   1190 = 7292 4   1500 = 356C C   1810 = 447B C   2120 = E350 8
 290 = 4B98 E    580 = F557 8    890 = D699 F   1200 = F5F7 9   1510 =  27C 4   1820 = ED0F B   2130 = 47BC C
```

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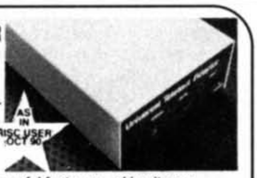

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What's bugging you?

Stephen Ramplin continues his error handling series by TRACEing some obscure leads on the way to STOPping those elusive errors

HOPEFULLY last month's article has helped you track down some previously elusive bugs. Programs that still contain errors will need more subtle techniques, so let's take a look at what you can do to find the cause of trickier problems.

It's already been pointed out that Basic sometimes reports an error in a line that is correct, because the fault is elsewhere but only becomes apparent at this line. There's a table on the next page listing the errors which can occur due to mistakes elsewhere, accompanied by the possible cause. Always check the line itself first though – don't assume the worst. The next step is finding out where things begin to go wrong.

As an example let's say your adventure game grinds to a heart-stopping halt with the error *Subscript at line xxx*. We will assume you have tried everything, and the only remaining explanation is that elsewhere in your program you have corrupted the subscript variable – that's the one between the brackets of an array.

You could weave through the listing on the screen or a printout. What is needed, however, is a method to follow the program as it runs, printing out each line number as the line is executed. Such a facility is included within the Basic rom and is activated by entering TRACE ON.

Alternatively, TRACE plus a line number will print out lines below that number: TRACE 1000, for instance, will list the numbers less than 1000 as they are executed.

The command TRACE OFF, pressing Escape, or the occurrence of an error deactivates the trace.

This facility is fine as far as it goes, but often the line numbers are printed too quickly to follow, and they can go all over the screen. To overcome this problem Listing I is a trace extension program: Advanced Trace, or AT for short.

The advantages of AT are that the line numbers are output to a window at the top of the screen and single stepping is provided. The latter feature waits for you to press the spacebar after each printed line number.

Enter Listing I, use the checksums to ensure you've made no errors, save and then RUN it. This creates a machine code program which is saved to tape or disc under the filename AT. To activate the utility enter *RUN AT.

The commands STEP ON and STEP OFF switch the single stepping on and off respectively. The trace command is still

➤

Listing I

```
   10 REM Advanced TRACE
   20 REM By Stephen Ramplin
   30 REM (c) The Micro User
   40 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   50 MODE135
   60 *FX200
   70 *KEY10 OLD|MRUN|M
   80 flag=&70:stepflag=&71:chr=&72
   90 pos=&73:vpos=&74:store=&80
  100 brkv=&202:traceflag=&20
  110 wrchv=&20E:oldbrk=!brkv AND&FFFF
  120 oldwrch=!wrchv AND&FFFF
  130 IF oldbrk=&91B CALL!-4 ELSE*FX18
  140 osrdch=&FFE0:osbyte=&FFF4
  150 input=&700:steptkn=&88
  160 ontkn=&EE:offtkn=&87
  170 FORpass%=0TO3STEP3:P%=&900
  180 [OPTpass%:.intcpt LDA#newbrk MOD25
6:LDX#newbrk DIV256:LDY#newwrch MOD256
  190 SEI:STAbrkv:STXbrkv+1:STYwrchv:STX
wrchv+1:CLI:LDA#0
  200 STAflag:STAstepflag:RTS
  210 .newbrk PHA:TYA:PHA:TXA:PHA:LDY#0:
LDA(&FD),Y:CMP#16:BEQcheck
  220 .not PLA:TAX:PLA:TAY:PLA
  230 JMPoldbrk:.check JSRspaces:CMP#ste
ptkn:BNEnot:JSRspc:TAX:JSRspc
  240 CMP#13:BNEnot:CPX#ontkn:BEQon:CPX#
offtkn:BNEnot:LDA#0:BEQsetflg
  250 .on LDA#&FF:.setflg STAstepflag:PL
A:TAX:PLA:TAY:PLA:RTS
  260 .spc INY:.spaces LDAinput,Y:CMP#32
:BEQspc:RTS
  270 .newwrch STAchr:TYA:PHA:TXA:PHA:LD
Atraceflag:BEQexit
  280 LDAchr:LDYflag:BEQchecksqbrac:CPY#
7:BEQreset:CMP#ASC"]"
  290 BEQdo:CMP#ASC"0":BCCreset:CMP#ASC"
9"+1:BCSreset:BCCdostore
  300 .checksqbrac CMP#ASC"[":BNEexit
  310 .dostore STAstore,Y:INCflag:LDA#0
  320 STAchr:.exit PLA:TAX:PLA:TAY:LDAch
r:JMPoldwrch
  330 .reset STAstore,Y:LDX#&FF
  340 .loop LDAstore+1,X:JSRoldwrch:INX:
CPXflag:BNEloop
  350 LDA#0:STAflag:STAchr:BEQexit
  360 .do STAstore,Y:LDA#134:JSRosbyte:S
TXpos:STYvpos
  370 LDX#0:LDY#0:JSRtab:STYflag:STYchr
  380 .loopB LDAstore,Y:JSRoldwrch:CMP#A
SC"]":BEQdone:INY:BNEloopB
  390 .done LDAstepflag:BEQnopause
  400 .pause JSRosrdch:BCSexit:CMP#32:BN
Epause:.nopause
  410 LDXpos:LDYvpos:JSRtab:JMPexit
  420 .tab LDA#31:JSRoldwrch:TXA:JSRoldw
rch:TYA:JMPoldwrch
  430 ]:NEXTpass%
  440 PRINT"Press Return To Save the Mac
hine Code":REPEATUNTILGET=13
  450 *SAVE AT 900 9FF
```

Get it right ✓

```
 10 =    0 0    160 = 5B99 6    310 = E904 7
 20 =    0 0    170 = F9BE D    320 = B7BF 6
 30 =    0 0    180 = B63B 7    330 =  667 8
 40 = BC2B B    190 = 3D44 3    340 = D452 E
 50 = 5E50 4    200 = 99C6 4    350 = 9F32 9
 60 =  71C F    210 = 31D1 7    360 = 8E4E 5
 70 = 8FBE 5    220 = 1B59 1    370 = C2D0 3
 80 = 498F E    230 = C02F F    380 = D228 9
 90 = B907 4    240 = E78C 5    390 = 250F 2
100 = FC4F 3    250 = 4E0B B    400 = A25D F
110 = B747 E    260 = 6E6A 9    410 = 4F3C 6
120 = 38D0 9    270 = 7051 7    420 = FFC3 D
130 = 9A56 6    280 = 53E2 C    430 = 68CD 4
140 = 8ACC E    290 = B4B0 2    440 = 9C03 6
150 = E6E5 1    300 = 7486 9    450 = 3EDA 3
```

How Basic rom reacts

To round off the articles concerning Basic errors let's take a look at what the rom does when responding to an error:

Initially the value in ERL is set to zero, where it remains if in command mode. If a program was running when the error occurred ERL is set to the line number.

Basic reports the error with its inbuilt handler if the value of ERR is zero, if you're in command mode or if there is no ON ERROR statement in a program. Otherwise Basic executes the statements after ON ERROR.

Before this occurs the trace, opt, repeat/until, gosub and for/next depth counters, the pointer to the next data item, the Basic stack pointer and the machine stack pointer are all reset to default values.

Listing II

```
 10 REM Error Handler Demo
 20 REM By Stephen Ramplin
 30 REM (c) The Micro User
 40 ONERROR PROCerror(135,2,2):END
 50 MODE135
 60 VDU23;8202;0;0;0;
 70 REM Don't correct the next line
 80 Mistake
 90 END
100 DEFPROCerror(mode%,back%,fwrd%)
110 VDU22,mode%:IFback%<2 back%=2
  120 PRINT:REPORT:PRINT" at line ";ERL
  130 I%=PAGE:IFNOT(I%?1=ERL DIV256 ANDI
%?2=ERL MOD256) THENREPEAT:I%=I%+I%?3:UN
TIL(I%?1=ERL DIV256 ANDI%?2=ERL MOD256)
  140 J%=PAGE:DIMN%(back%-1):IFNOT(I%=J%
) THEN REPEAT:FORN%=0TOback%-2:N%(N%)=N%
(N%+1):NEXT:N%(back%-1)=J%?1*256+J%?2:J%
=J%+J%?3:UNTIL(I%=J%):L%=N%(0)
  150 C%=fwrd%:REPEAT:I%=I%+I%?3:C%=C%-1
:UNTILC%=FALSE ORI%?1=&FF:H%=I%?1*256+I%
?2:list$="KEY0 L."+STR$L%+","+STR$H%+"|M
":$&700=list$:X%=0:Y%=7:CALL&FFF7:*FX138
,0,128
  160 ENDPROC
```

```
10 =    0 0    50 = 5E50 6     90 = FD2E E    130 = FBD4 E
20 =    0 0    60 = F716 4    100 = 73E2 A    140 = 4EA5 0
30 =    0 0    70 =    0 4    110 = 2336 A    150 = 6344 0
40 = 57E9 9    80 = 1C44 1    120 =  499 E    160 = EDOF 7
```

Get it right ✓

➤

used to call up the facility. Notice that the trace is cancelled by changing the step status, so issue the step command first. The current step status is remembered when the trace is switched off. A technical description of how AT works is provided on the next page.

Another error hunting trick involves the strategic use of the STOP command, an untrappable error, which is used to halt execution at a particular point in your program. You can then investigate variable values to help ascertain where problems begin. Accompanied by trace, this method becomes very powerful.

Returning to the subscript example, TRACE could tell you which program sections are executed before the error, and STOP could be used to find out where the subscript variable took on the erroneous value.

Another option is to insert a beep, VDU7, into your program, which is particularly useful for following progress though a loop. You can count how many times the loop executes before an error occurs, allowing you to isolate the cause, and discover why it didn't occur first time.

Garbage in garbage out

Last month I promised to provide some tips on debugging error-strewn data lines. Firstly, let's deal with the error *Out of DATA*. This occurs when there is insufficient data in a program: It means you have either missed an item out or merged items together. Unfortunately, the error is reported in the line containing the read statement, which is not at all helpful. To find the fault all the data lines need to be checked – not a particularly inviting task.

Finding an error in 100 lines of data can be like looking for the proverbial needle in a haystack – there must be a way to make it easier. One method involves printing out the data after it has been read and checking it against the listing.

If the data adheres to a strict format, the checking is easier. For example, if the data consists only of integers and somewhere instead of a comma you introduced a full stop making a decimal, it sticks out like a sore thumb when printed.

The same technique applies to finding incorrect data items which only become apparent through a corrupted screen display. Print each data item as the screen is drawn, and when the corrupt part pops up the incorrect data value is right before your eyes.

Another example of a problem which

➤

Data statement trouble shooter

- An *Out of DATA* error message means there is not enough data in the program.
- If you have not missed any numbers out and still have an out of data error you may have entered a full stop instead of a comma, merging two data items into one.
- If you have accidently entered text instead of numeric data the error *No such variable* occurs.
- If you have entered too much data, or the correct amount but incorrect values, no error will be reported. The fault will become apparent through a corrupted screen display, for instance.

Obscure errors and their possible causes

The errors tabled here have been organised into three groups of similar cause:

- The first group contains errors which could be due to a misspelt variable name/procedure definition where it is defined in the program or in the line itself: Arguments; Array; No such FN/PROC; No such variable.
- The second group includes all those errors which could be due to a variable obtaining an incorrect value. In some cases, such as mathematical functions, this only applies if the keyword is followed by a variable rather than a value: Accuracy lost; Bad Hex, as in A%=EVAL("&"+hex$) if *hex$* contains an illegal value; Division by zero; $ range, as in $space="" if *space* points to zero page; Exp range; Log range; -ve root; ON range; String too long; Subscript; Too big.
- The third group houses errors probably due to poor program structure: Can't match FOR; No GOSUB; No FN; No FOR; No PROC; No REPEAT; Too many FORs; Too many GOSUBs; Too many REPEATs.

Although all these errors can occur in obscure circumstances, they can happen in obvious situations. Always check these first – don't assume things are more complicated than they actually are.

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '*' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
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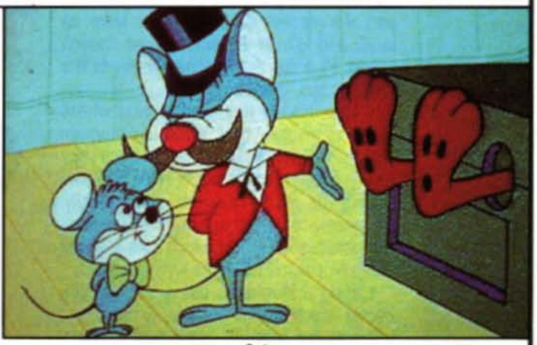

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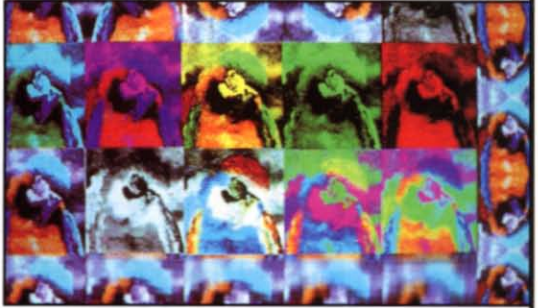

Some Digitiser Effects

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Acorn User - April 90

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Access

can be solved using this technique is where part of a number is replaced by a letter, as in 20 and 2O. In the latter, Basic doesn't report an error, but incorrectly reads the value as two, instead of 20.

If you inadvertently enter text where numbers are required, when the program tries to read the datathe error *No such variable* is reported, once again in the line containing the read statement. Superficially, this seems to be just as unhelpful, however it is possible to find out which data line was being processed when the error occurred.

Listing II illustrates using the function *dataln*, which returns the line number of the last data line read. To use it, add the function to your program, modify the ON ERROR statement and then add the line:

```
L%=!&1C AND&FFFF
```

directly before the read statement in which the error is reported. Then rerun the program and when the error occurs you will be told which line contains the bad data.

The function isn't perfect, and in two circumstances will report the wrong line. If the very first item of data is incorrect the first line of the program is reported. Secondly, if the bad data is the first item on a line then the previous data line is reported as containing the error. So if the indicated line is correct, check the first item of the next one.

The function works by using Basic's data pointer, which is put into *L%*, to find the line number from memory. Table II is a data error checklist and summarises the possible causes of data errors.

● *Next month there will be help for those of you trying to debug your own assembly language programs. until then give those elusive bugs a run for their money.*

How advanced trace works

For all you technical buffs out there, here's a brief description of how the advanced trace works. Both the *break* vector and *oswrch* vector are intercepted, the former to add the STEP ON/OFF command and the latter to implement the new trace.

To understand how the new commands were added you must realise that they would normally cause an error. Hence, all that is required is to check incoming errors as they pass through *brkv* to see if the new commands are responsible. If they are, the appropriate routine is carried out.

AT works by trapping the line number as it is printed by Basic. It is output to the corner of the screen and if single stepping is activated nothing else happens untill you press the spacebar.

A series of tests are performed on the characters entering *oswrch* to ensure only line numbers are trapped, and not text within square brackets, for instance. The program is not foolproof, but will handle most situations.

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ARM code	☐	☐	☐	☐	☐
Hardware	☐	☐	☐	☐	☐

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	Only	*Mostly*	*Some*	*Not much*	*Never*
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....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
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MU3

THE MICRO USER

Disc guzzler's delight

Graham Kendall shows how to crunch your facts into far less space – and safeguard your secrets at the same time

IF you do a lot of wordprocessing you'll find you go through a lot of discs. Deleting files is not always the answer, as you may want to keep the information and it's more convienient to retain articles, letters and half-finished novels on disc rather than having piles of paper cluttering up the place.

But the fact remains though that most of the files will hardly ever be used and all they are doing is occupying valuable space.

By examining text you can see many words appear time and time again: Like *it*, *and*, *the* and *computer*. If these words were stored in just one byte instead of three, four or even more you could save quite a bit of space.

This is the thinking behind the program shown here. When run it will take a file and compress common words to just one byte.

Depending on the length and the number of words you have decided to compress, this can make impressive savings on the amount of disc space required to store the file – savings of more than 50 per cent are easily achievable.

Of course, once compressed a file cannot be used until you expand it again, so this program will do that job too.

Type in the listing and ensure you've made no errors using the checksums. Save it as Compres then go to your wordprocessor and create a file of text. If you use View, Inter-Word or 1st Word Plus the text file will need to be spooled – printed to disc or saved as pure text – so that no control characters are included. Wordwise files are usable as they stand.

It is vitally important that you do not try to compress a non-text file, as it will almost certainly be corrupted beyond repair.

When you run the program it will ask if you want to compress or expand a file. It will then call for input and output file names. If you are compressing a file the program checks each word it reads against a list it contains.

When a word is matched, instead of writing the complete word to the output file it writes a one byte value instead.

The expand option looks the same, but this time the program looks for the compression codes and when it finds one writes the corresponding word to the output file.

You can decide which words to compress by changing the DATA statements at the end of the program. If you increase the number of words you will also need to alter line 1540 so that the number matches the number of words available.

This list also includes the code that will be used to represent the word that precedes it. For example, in the program as it stands *and* will be replaced with code 255. Bear in mind that you have to use the same set of words and codes when you're decompressing, otherwise you won't get the same file back.

In fact this is also a good feature, as once you have compressed the text the file will be unreadable unless somebody knows which bytes represent which words. So if you are holding data which is for your eyes only you can compress the file and it will appear as garbage to anybody else, even if they *DUMP it.

So now you can both save space and make your files more secure.

The words and their codes

As it stands, the program provides compression of just six words, but for practical use you should increase them, perhaps using ones which are particular to the type of text you are writing.

Available codes are the numbers 128 to 255, although if your text does not include the more unusual punctuation you could also use the Ascii codes for characters like {, }, [,], |, @ and so on. Your computer manual will include a complete list of all Ascii values.

```
   10  REM Text Compression/Expansion
Utility
   20  REM by Graham Kendall
   30  REM (c) The Micro User
   40  PROCinit
   50  REPEAT
   60  PROCExpOrCmprs
   70  PROCopenFiles
   80  PROCctrl
   90  UNTIL FNask=FALSE:END
  100  :
  110  DEF PROCinit
  120  READ NoOfWords%
 130DIM Words$(NoOfWords%),CmpCodes%(
NoOfWords%),WordStore%(50)
  140  FOR I%=1 TO NoOfWords%:READ Words
$(I%):READ CmpCodes%(I%):NEXT
```

➤

➤

```
  150  Expand%=FALSE
  160  WordStore$=""
  170  ChrCnt%=0
  180  ENDPROC
  190  :
  200  DEF PROCExpOrCmprs
  210  IF FNchoice Expand%=TRUE ELSE Exp
and%=FALSE
  220  IF Expand% PROCSetExpVars ELSE PR
OCSetCmpVars
  230  ENDPROC
  240  :
  250  DEF PROCSetExpVars
  260  Heading1$="Text Expansion Utility
"
  270  Heading2$="Expanded"
  280  ENDPROC
  290  :
  300  DEF PROCSetCmpVars
  310  Heading1$="Text Compression Utili
ty"
  320  Heading2$="Compressed"
  330  ENDPROC
  340  :
  350  DEF PROCopenFiles
  360  REPEAT CLS:PROCcn(Heading1$,2)
  370  PROCcn("Please enter file to be "
+Heading2$+CHR$&0A+CHR$&0D,10)
  380  INPUT Inp$:UNTIL FNinputOk(Inp$)
  390  REPEAT CLS:PROCcn(Heading1$,2)
  400  PROCcn("Please enter output file"
+CHR$&0A+CHR$&0D,10)
  410  INPUT Out$:UNTIL FNoutputOk(Out$)
  420  ENDPROC
  430  :
  440  DEF FNinputOk(t$)
  450  In%=OPENIN(t$)
  460  IF In%=0 PROCerr("File does not e
xist"):Ind%=FALSE ELSE Ind% =TRUE
  470  =Ind%
  480  :
  490  DEF FNoutputOk(t$)
  500  Out%=OPENOUT(t$)
  510  IF Out%=0 PROCerr("Error in openi
ng output file"):Ind%=FALSE ELSE Ind% =T
RUE
  520  =Ind%
  530  :
  540  DEF PROCctrl
  550  REPEAT
  560  PROCReadNextByte
  570  UNTIL EOF#In%
  580  IF NOT Expand% PROCFoundSpace
  590  CLOSE#0
  600  ENDPROC
  610  :
  620  DEF PROCexpand
  630  CodeMkr%=FNFindCmpCode
  640  IF CodeMkr%=-1 PROCWriteByte(byte
%) ELSE PROCExpWord
  650  ENDPROC
  660  :
  670  DEF PROCcompress
  680  IF byte%=&20 PROCFoundSpace:PROCW
riteByte(&20) ELSE PROCBuildUpWord
  690  ENDPROC
  700  :
  710  DEF PROCReadNextByte
  720  byte%=BGET#In%
  730  IF Expand% PROCexpand ELSE PROCco
mpress
  740  ENDPROC
  750  :
  760  DEF PROCWriteByte(Y%)
  770  BPUT#Out%,Y%
  780  ENDPROC
  790  :
  800  DEF PROCBuildUpWord
  810  ChrCnt%=ChrCnt% +1
  820  WordStore%(ChrCnt%)=byte%
  830  WordStore$=WordStore$+CHR$(byte%)
  840  ENDPROC
  850  :
  860  DEF PROCFoundSpace
  870  IF FNFindWord PROCWriteByte(CmpCo
des%(Position%))
  880  IF NOT FNFindWord AND ChrCnt%>0 P
ROCWriteFullWord
  890  WordStore$=""
  900  ChrCnt%=0
  910  ENDPROC
  920  :
  930  DEF PROCWriteFullWord
  940  FOR I%=1 TO ChrCnt%
  950  PROCWriteByte(WordStore%(I%))
  960  NEXT
  970  ENDPROC
  980  :
  990  DEF PROCExpWord
 1000  FOR Y%=1 TO LEN(Words$(CodeMkr%))
 1010  Y$=MID$(Words$(CodeMkr%),Y%,1)
 1020  PRINT "Y$=";Y$
 1030  PROCWriteByte(ASC(Y$))
 1040  NEXT
 1050  ENDPROC
 1060  :
 1070  DEF FNFindWord
 1080  Code%=FALSE
 1090  FOR I%=1 TO NoOfWords%
 1100  IF WordStore$=Words$(I%) Code%=TR
UE:Position%=I%:I%=NoOfWords%
 1110  NEXT
 1120 =Code%
 1130  :
 1140  DEF FNFindCmpCode
 1150  Code%=-1
 1160  FOR I%=1 TO NoOfWords%
 1170  IF byte%=CmpCodes%(I%) Code%=I%:I
%=NoOfWords%
 1180  NEXT
 1190 =Code%
 1200  :
 1210  DEF FNask:CLS
 1220  PROCcn(Heading1$,2)
 1230  PROCcn("Do you want to process an
other file?",10)
 1240  A%=FNin("YyNn")
 1250  IF A%=1 OR A%=2 A%=TRUE ELSE A%=F
ALSE
 1260  CLS:=A%
 1270  :
 1280  DEF FNchoice:CLS
 1290  PROCcn("Text Compression/Expansio
n Utility",2)
 1300  PROCcn("Do you want to Compress o
r",10)
 1310  PROCcn("expand a file (C or E)",1
1)
 1320  A%=FNin("EeCc")
 1330  IF A%=1 OR A%=2 A%=TRUE ELSE A%=F
ALSE
 1340  CLS:=A%
 1350  :
 1360  DEF PROCerr(t$)
 1370  PROCcn(t$,22)
 1380  PROCspace
 1390  ENDPROC
 1400  :
 1410  DEF PROCcn(t$,Y%)
 1420  LOCAL X%:X%=19-LENt$/2
 1430  PRINTTAB(X%,Y%)t$;:ENDPROC
 1440  :
 1450  DEF PROCspace
 1460  PROCcn("Press space to continue",
24)
 1470  Z%=FNin(" ")
 1480  ENDPROC
 1490  :
 1500  DEF FNin(k$):LOCAL I%
 1510  REPEAT I%=INSTR(k$,GET$)
 1520  UNTIL I%>0:=I%
 1530  :
 1540  DATA 6
 1550  DATA and,255,the,254,to,253,it,25
2,that,251,are,250
```

SUBSCRIBE NOW!

If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

Get it right ✓

```
  10 =    0 0 |  270 = 320B 0 |  530 = CE3C 7 |  790 = 9719 C | 1050 = ED0F D | 1310 = 49A3 B
  20 =    0 0 |  280 = ED0F 8 |  540 = ED6E 3 |  800 =   F1 0 | 1060 = 9719 0 | 1320 = 7CD4 4
  30 =    0 0 |  290 = 9719 1 |  550 = BFBA 7 |  810 = 4CC0 9 | 1070 = 7E97 8 | 1330 = 4FBE 0
  40 = DEBB B |  300 = FE35 1 |  560 = D678 F |  820 = F40A 6 | 1080 = 714E 2 | 1340 = 5291 9
  50 = BFBA 9 |  310 = C659 E |  570 = 9339 1 |  830 = 7512 3 | 1090 = A8D2 1 | 1350 = 9719 3
  60 = EE39 7 |  320 = 24B8 C |  580 = FE0D 0 |  840 = ED0F 5 | 1100 = 1397 0 | 1360 = 7B1C D
  70 =  22D 5 |  330 = ED0F 7 |  590 = 9EE3 B |  850 = 9719 4 | 1110 = 2C83 7 | 1370 = 1926 B
  80 = 7E02 0 |  340 = 9719 6 |  600 = ED0F 5 |  860 = 7882 F | 1120 = D4FA 4 | 1380 = 65FC 3
  90 =  E01 2 |  350 = FDEF F |  610 = 9719 1 |  870 = 6926 9 | 1130 = 9719 6 | 1390 = ED0F E
 100 = 9719 F |  360 = AAFB C |  620 = 302E B |  880 = 6F65 4 | 1140 = 51DF E | 1400 = 9719 5
 110 = 40D7 A |  370 = 6BED 0 |  630 = 2788 0 |  890 = 9625 1 | 1150 = 3E53 F | 1410 = 179A F
 120 = 92CD F |  380 = 4925 C |  640 = 53E7 B |  900 = D7D1 E | 1160 = A8D2 4 | 1420 = 9BFE 7
 130 = D761 D |  390 = AAFB E |  650 = ED0F A |  910 = ED0F 2 | 1170 = 3CB1 E | 1430 = DF37 8
 140 = 4791 3 |  400 =  702 0 |  660 = 9719 3 |  920 = 9719 F | 1180 = 2C83 1 | 1440 = 9719 7
 150 = C63B C |  410 = 53F0 B |  670 = E45A 3 |  930 = 2388 6 | 1190 = D4FA 2 | 1450 = 6B8B 6
 160 = 9625 7 |  420 = ED0F 0 |  680 = 48B3 5 |  940 = E19B B | 1200 = 9719 5 | 1460 = 5F86 C
 170 = D7D1 F |  430 = 9719 1 |  690 = ED0F 8 |  950 = 92F7 F | 1210 = 7808 F | 1470 =  FC6 E
 180 = ED0F B |  440 = 507D 1 |  700 = 9719 B |  960 = 2C83 D | 1220 = D8E8 F | 1480 = ED0F A
 190 = 9719 D |  450 = DC66 0 |  710 = 692D A |  970 = ED0F 0 | 1230 = 471F 8 | 1490 = 9719 D
 200 = 32C9 5 |  460 = A7D5 3 |  720 = 2357 D |  980 = 9719 4 | 1240 = 9915 0 | 1500 = 3135 1
 210 = 92F5 D |  470 = 833C 8 |  730 = 7260 E |  990 = CF12 6 | 1250 = 4FBE 2 | 1510 = C574 F
 220 = 6EA5 7 |  480 = 9719 F |  740 = ED0F 5 | 1000 = 5AB8 9 | 1260 = 5291 B | 1520 =  F1E 7
 230 = ED0F 6 |  490 = 47C9 B |  750 = 9719 B | 1010 = 98C5 E | 1270 = 9719 1 | 1530 = 9719 6
 240 = 9719 D |  500 = 1DA3 B |  760 = 2EEB 6 | 1020 = E717 D | 1280 = 6272 D | 1540 = 4086 7
 250 =  695 4 |  510 = 4416 F |  770 =  A10 5 | 1030 = CF21 4 | 1290 = 5078 8 | 1550 = BF8B D
 260 = C548 B |  520 = 833C 8 |  780 = ED0F E | 1040 = 2C83 F | 1300 = F3AB 2 |
```

Stringing along with anagrams

IN the March 1989 edition of **The Micro User** *there was a library routine by Ian Fell for generating anagrams (permutations) of a string input by the user.*

Here is an improved version which manipulates the characters in the string directly, so avoiding the slow Basic INSTR command, and the bug which prevented the program working with Basic I.

It will print all the permutations of a nine character string in a little over two hours – 10 times faster than the original version:

```
 10 REM Anagrams
 20 REM by Phil Bender
 30 MODE 7
 40 DIM M% 21
 50 INPUT"Enter string:"S$
 60 S%=LEN S$
 70 W%=S%+3:WIDTH (39 DIV W
%)*W%
 80 $M%=S$
 90 PROCperm(S%)
100 END
110 DEFPROCperm(X%)
120 IF X%=0 PRINT $M%"  ";:
ENDPROC
130 LOCAL J%
140 J%=X%
150 REPEAT
160 T%=M%?J%:M%?J%=M%?X%:M%
?X%=T%
170 PROCperm(X%-1)
180 T%=M%?J%:M%?J%=M%?X%:M%
?X%=T%
190 J%=J%-1:UNTIL J%
```

The width command is used to print the output in columns, and a REPEAT loop in PROCperm replaces FOR, since REPEATs may be nested 20 deep as opposed to 10 FOR loops. This does restrict the input string to 20 characters or less though.

Since producing all the permutations of a 20 character string will take about 1.6 billion years, it's unlikely to be a major problem. – **Phil Bender, Harold Wood, Essex.**

£10 *Prize letter*

Sleepless nights

I DOUBT if many of your readers will lie awake at night worrying about the error in the calendar program by Martyn Fox, published in the January issue of **The Micro User**, *but for the purist, 4 AD was not a leap year.*

Julius Caesar reformed the calendar in the year before he was murdered. During the Civil War that followed, the unsupervised Senate had ordered intercalations in every third year because the Romans counted like that.

The Emperor Octavian then called himself Augustus Caesar, named a month after himself and messed up the alternate succession of 30 and 31 days in the months for all time.

His reform included nominating our 8 AD (not called that then, of course) as the first leap year in the yet-to-be-invented Christian epoch.

The days omitted from September 1752 caused riots, but it is much more significant to us with the longer perspective of time on our side, that the year 1751 was shortened by three months when the start of the year was moved.

Give or take a week, the first three months of the historical year were actually the last three months of the old-style year for around a thousand years in England, or even longer (with gaps) if you recognise a calendar before Bede. I think that a program that sets out to print a calendar for any given month ought to indicate this. – **Michael Leete, Rowarth, Cheshire.**

Getting the !Boot

*AFTER discovering !Boot files about a year ago I have now two methods of creating them. One with the *BUILD command and the second a Basic program which holds instructions, starts spooling then prints to the screen.*

However on some games I notice that the !Boot file instructions are not printed on the screen. Please could you show me how this can be achieved without using VDU21 as the first instruction in the !Boot file. – Roger Hadd, Whickham, Newcastle Upon Tyne.

● The most likely reason for the instructions not appearing is that ithe !boot isn't a text file. There are four boot types, selectable using *OPT4,x. Where x is zero no booting occurs at all. This is how newly formatted discs appear.

Option three is the usual one and the command *EXEC !Boot is sent to the filing system. You usually have a text !boot file in this case, perhaps starting with VDU21.

Option one sends a *LOAD !Boot command, and anyone who knows a good use for this one might like to let us know!

But the final option, two, produces a *RUN !Boot. In this case !Boot will be a machine code program, perhaps a menu or even a complete program in its

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

Sexism and the shopping basket

I WAS absolutely amazed that in this day and age you could produce such a sexist article as Shopping Around in your February issue.

Do you seriously believe you are addressing your magazine exclusively to men? If so, do you know this is illegal? If you need putting straight on the matter, more women use computers in their jobs than men do.

Your magazine is read by women, and even more would probably read it if you did not have writers who appear to live in the 1950s. – **Hilary Pegg, Leeds. (A wife and owner of an Archimedes 310 and reader of your magazine!)**

● We agree that the by-line was sexist – but not the article, which was a useful utility – and we'd like to make it clear that the author of the program did not write the by-line.

The originator of that comment has been spoken to by his wife, so we won't see anything like that again.

➤

Any leg to stand on?

I HAVE a serious question to ask about buying computer-software.

Just after Christmas last year I reluctantly bought a game for my BBC B from a reputable computer dealer here in Cardiff.

The game, Martech's W.A.R., cost me £5.99 and was on cassette, hence the reason I was not so sure whether to buy it or not, as I more commonly use disc.

I only really bought the program because it was recommended to me by a friend and I was curious as to its quality. When I finally got round to playing it, I was surprised at its poor quality and decided to return it.

But the company I bought it from refused to accept it. Even when I offered to forfeit my receipt in order to qualify for a refund, I was told they could not take the cassette due to the risk of pirating.

Have you any idea of my legal rights in such a situation, and can I demand a refund?

I am sure many of your readers are interested in the subject of legal rights when concerned with the purchasing of software, so maybe you could enlighten us all. – **S.Roberts, Whitchurch, Cardiff.**

● The company in question can't refuse to take it back on the basis of piracy, but since the game was clearly of merchantable quality when you bought it there's no reason in the world why they should take it back. Just because you don't like it is irrelevant.

If you bought a music cassette that was recommended to you by a friend you wouldn't expect the music shop to take it back because you didn't like it. The only way around this is to try before you buy.

Although the company can't use the piracy idea as an excuse, they are quite justified in their assumption that you might have copied it. After all tape to tape copying is extremely easy. Frankly, you don't have a leg to stand on.

More Body Building

WOULD IT be a good idea for Mike Cook's Body Building Course to have sent-in suggestions and solutions for projects? Admittedly it would provide very specific projects, but might involve a lot of inspiration for anybody interested in this field

On a different point, I enjoy having a blast at Beastiroids, but the high score table listing published in the October 1988 issue of The Micro User *does not indicate the keys used for the game. This is unfortunate for first-time players.*

To counteract this, type in the Beastiroids game listing with the high score table amendments, except do not alter line 230, but change line 240 to:

```
240RESTORE250:FORT%=9TO17STEP2
:READA$:PRINTTAB(2,T%)A$;:NEXT
```

In Mike Goldberg's Car Race from the September 1990 issue line 690 does not match the checksums and does not print the car properly. The problem was that the back apostrophe after the second FF was printed instead of a pound sign. – **Daniel Doran, Birmingham.**

● Thanks for the games changes, unfortunately differences between printers and computers can sometimes result in this type of difficulty.

In fact Body Building ideas often come from letters to Mike Cook, so if you have any particular ideas he'd certainly like to hear about them – but he won't solve your CDT projects for you.

Helping hand for beginners

WE are newcomers to computing and have just purchased a second hand BBC Micro with Wordwise Plus and Opus disc drive, but we do not have any manuals so I wondered whether you knew of anyone who could get me one – especially a User's Guide for the BBC Micro.

Also we have been told that it is possible to expand the memory. If so how?

Lastly, I looked inside the computer and found there were four rom chips. Two came with the computer as they are the same, another one is for Wordwise Plus. How can I find out what the last one is for. Could it be something to do with a printer?

On the subject of printers, could you recommend one for use primarily by my son, but also better quality as I intend to use Wordwise for my job.

Is it possible to make the BBC Micro PC-compatible? – **Mrs T. Harkin, Weston-Super-Mare, Avon.**

● Manuals for the micro itself are available from Watford Electronics and other major dealers. It is possible to expand the memory to some extent, but we recommend discussing it, and printers, with a local dealer, as they're both quite complex subjects.

The third chip you mention is likely to be the software that drives your disc drive rather than for a printer. If you type *HELP it will give a list of the roms you have in your machine – except Basic.

It is possible to make the BBC Micro PC-compatible using the Watford Electronics Co-Pro adapter.

Completing the set

I THINK you'll be pleased to know of the response I had to my classified offering a complete set of The Micro User *magazines from March 1983. I have had more than 20 calls and could have sold them many times over.*

Unfortunately, having sold them and posted them to a buyer in Scotland, the Post Office managed to smash the parcels open and lose some of the magazines. In order to complete the set again, the following back issues are urgently needed: April 1987, October 1987, December 1987, January 1989, February 1989 and April 1989.

I would be grateful if you would send me an indication of whether these issues are still available from you, and details of the pricing.– **G. J. Monney, Brentwood, Essex.**

● Unfortunately we're out of these. Can anyone help?

Master rom rocks the boat

I AM seeking your assistance with a problem that I am experiencing in transfering from a BBC B to a Master 128. I have written database programs that has been running very sucessfully for some years on the BBC B. When I run this program on the Master all the data is handled correctly, including the input of new data.

However, when new data is input, all goes well until I return to the main menu and the file is closed. Instead of the file ending at the last entry point, it will jump some way ahead. The current end of the data file, ALL, is at &B2E3, but when it is closed by the Master it jumps to &10000, apparently irrespective of the number of entries added.

I have tried starting a completely new file, but the same sort of thing happens. After only three or six entries, the file will close at &40. – **John W. Tookey, Redhill, Surrey.**

● You have fallen foul of a major bug in the Master Operating System which produces exactly the effect you've described – files are closed larger than necessary. A Master Operating System rom upgrade that can be bought from your local dealer.

Colouring an Electron

RECENTLY I acquired a Star LC-10 colour printer for my Acorn Electron. The rest of the outfit consists of Plus 1, Plus 3, AP5 from ACP, and an additional 5.25in drive from Cumana with DFS.

There is a colour dump rom from ESM of Wisbech, *Camrbidgeshire, but they are unable to tell me whether it will work on the Electron and it is designed for the BBC and Master computers.*

The rom costs £40 and I am reluctant to shell out until I know it will work. Can you shed any light on the matter. Has anyone tried it, tested it or has an alternative to suggest?

I woud be grateful for any help you or your readers may be able to give me on this matter. **–H. Bottom, Stannington, Sheffield.**

● We have not had an opportunity to try this rom on an Electron. Has any reader succeeded with this? Check out the article on colour printers in this issue for the ScreenThief rom by NorthWest SEMERC.

Serious Filer bug discovered

HERE's a quickie that you might be able to find space for somewhere. There's a rather nasty bug in the ADFS of the Archimedes which only surfaces with write-protected discs.

The fault is best demonstrated using a disc that has just one file on it, say "Test", and has then been write protected. If you type the following from Basic you will get the correct Protected Disc *message:*

```
F%=OPENOUT"notTEST"
```

But he line below will actually return a valid file handle:

```
F%=OPENOUT"Test"
```

If you now try to send bytes to the file, all will appear to be fine until you either exceed the ADFS buffer size or attempt to close the file. This will give you a Data Lost *error. To complicate matters further, saving a block of memory to the name as below will give the correct error mesage.*

```
*SAVE Test FD0+1000
```

Incidentally, did you know that in 16 colour modes you can redefine both flash colours independently? Use two flashing colours in alternate pixels and get animated feet, hands and other things! It's the extended VDU19 that does the trick as below:

```
VDU 19,colour,17,r,g,b
VDU 19,colour,18,r,g,b
```

–T.W. Blunt, Crowthorne, Berks.

Business computing

WE run a small business and use two Master Compacts and an Archimedes 310 for different purposes. While looking for a specialist product in the embroidery trade, we came across the various computers being advertised in their respective journals and in the embroidery trade press, but it was only by luck or fate that we came across an equivalent in the Archimedes range.

Could you consider a small business section with business profiles, specific add-on devices, like cutter-plotters, bar code readers, digitising tablets and so on?

Also information on communications with other computers, details on the best way of upgrading, discussing the advantages and disadvantages of using machines such as the R140 and its successors.

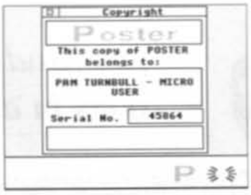
The main problem with people like us is that we use computers as a tool and need plenty of information and not how to program a computer.

Other computer users get either business sections or indeed specific magazines, for example Apple Business. I would hope that there are more Archies in this country than Apples What do you and the other readers think. **–Roderick Falconer, Arbroath, Angus.**

● Unfortunately the Archimedes, while completely capable of handling business data, still has a very long way to go to becoming a recognised business machine. At present it is still primarily a hobbyist and education micro.

Protection dilemma

HAVING SPENT over £80 on !Poster by 4Mation, I hate being asked Are YOU legally entitled to use it? *every time I load up a new file. Just think what would happen if other manufacturers did the same thing – there would be messages flashing up all over the place.*



Copyright

This copy of POSTER belongs to:

PAM TURNBULL - MICRO USER

Serial No. 45864

This is yet again one of those things that prevents the professional world from recommending the Archimedes.

Professional users do not want flashed messages – just decent, functional, competitively priced software.

From an office point of view the main products used are word processors (none worthy of mention yet on the Arc), spreadsheets (the Arc shows a lot of promise here), DTP (Impression II is superior to many products on IBM PC's and, for the price, superior to them all. There is no comparable product to Poster – as far as I know – so this is a first, perhaps.

That is my feeling, but perhaps others are not bothered. What do you think? – **D. J. Golding, Warfield, Berks.**

● We spoke to 4Mation about this and they pointed out that in their opinion !Poster has considerable advantages over other protection techniques.

!Poster's protection involves typing in ID initially – for example a school or company name, postcode, personal name or whatever – then making copies from the original.

Importantly: !Poster can't be copied until an ID is entered, but can be duplicated freely afterwards.

There's no added cost for hardware dongles, and if a school without a netework wants to run more than one copy at a time there's no need for more dongles or a site license. Any illegal copies of !Poster are easily spotted because the person or organisation using it don't match the ID.

Moving on to the window that comes up regulary, we feel it could be improved , but Impression, which you praise so highly, also flashes up a message when it loads.

In regard to professional software, all major programs on the Apple Macintosh have similar copyright screens with ID names on them – and that is very definitely a professional machine.

We think this is a storm in a teacup. What do other readers think about protection?

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

GETTING ready for a holiday can be a nightmare – you begin to wonder sometimes if you'll ever manage to leave on time, let alone actually arrive at the resort. It's not all that much different in *Terrormolinos*, where I left you last month in your bedroom – and only half packed.

Go into the bathroom next (south and east) where you should open cabinet and take the pills. Unless you want to be involved in an explosion later on, leave the can of shaving foam where it is.

Go west and west into the children's bedroom and examine the Tardis to reveal the bucket and spade. Take bucket will do for both items.

East on to the landing and down into the hall and you are ready to call Doreen and – if necessary – Ken and Beryl. Entering I (for Inventory) will soon tell you. Drop the steps, as the cabbie won't permit them inside his vehicle, and go south and hire taxi.

All you have to do now is follow the directions in the adventure to finish up at Terrormolinos and the Plaza. Since your hotel is the Excrucio, go east into the lobby and be prepared to receive lots of friendly advice about the places to visit.

Go straight up to your hotel room. Doreen will abscond while Ken and Beryl start unpacking. Relax and prepare for a little striptease act – yours – which is resolutely ignored by your audience.

Take trunks, remove clothes, wear trunks, then take, knot and wear hanky. You are now prepared to exhibit true Brit grit and go out into the noonday sun.

Take the camera, harpoon gun and snorkel and go down into the hotel lobby and then west into the Plaza. Northwest of you is the tourist quarter of town where you'll find essential ingredients – suntan lotion, film and flash cubes. Take them and then apply lotion, load film into your camera and go back southeast into the Plaza where you should take photo numero uno.

The beach is your next destination, so move northeast and take photo two, then continue north, take photo three, north, take photo four, and north to where the paddle boats can be hired. Take photo five.

Hire a boat and go out to the island to rescue Doreen. First call her away from the unexploded shell, then take photo number six before you board boat and fire gun to dispose of the shark. Now you can go back along the beach to the hotel.

A couple of points should be noted here. If you take Ken and the bucket and spade on to the second part of the beach he will bury you in the sand, and when the tide comes in things can get a bit nasty. If you wear the snorkel and swim in the sea you add more points to your score.

Finally – for this session, anyway – once you are back in your hotel room change back into your normal clothes, un-knot the hanky but keep it with you, then call everybody and make sure you have the camera, film and flash cubes.

Now go to the Plaza, then northwest into the tourist quarter and south to the nightclub area. When you find the nightclub with people doing John Travolta impressions (yuk) add cubes to your camera and take photo seven.

(To be concluded next month)

Flight of fantasy

The Mad Hatter takes to the skies in a fanciful extravaganza

Adventure Quest revealed

I was browsing through my solutions the other day when I realised with quite a shock that I had only dealt fully with *one* part of the Level 9 classic trilogy – Colossal Adventure, Adventure Quest and Dungeon Adventure.

While I have used parts of each game as material for a tutorial on how to tackle various aspects of adventure solving, the only full solution I have ever done was for Dungeon Adventure.

I think it's time I remedied that omission and – since I seem to be tackling it all back-to-front – we'll have a look first at **Adventure Quest**.

Although it was designed as a sequel to **Colossal Adventure** it stands on its own merits as a first-class text adventure and develops the notion of a teleport system into something much more sopisticated than in its predecessor.

The opening locations are the same, but it is clear from the descriptions that many, many years have passed and things are going to be different. You start outside the familiar building and there's a scroll to be read once you have located the Wizard.

The Wizard's message sets the scene and scope of the adventure: *Take the Talisman to the Black Tower through the four elements twice. It can defeat the Demon Lord, but only a companion can bring victory at the end. The Talisman is nearby, but you will also need four stones and these are guarded by servants of the Enemy.*

Now – to venture into tutorial mode for a moment – that introduction told me two very important things:

The *four elements* might be a little puzzling unless you are familiar with the ancient and mediaeval notion that they were Earth, Air, Fire and Water. It meant that I would be on the lookout for some underground locations, underwater ones, the odd hot spot and possibly dizzy heights too. Secondly, the message indi-

ELITE UPDATE

gue Hac Man has passed me a tten by RAF Corporal Clinch 1 Germany, and I confess to oughly puzzled.

ised to start Mission One while betent. He's also unable to run **Elite** utilities that I have fea- wonders why.

ns a Master Compact, and I at's the fly in the ointment, no hardware expert. Can any- ere tell em whether the Master is all that different as far as ncerned?

Burrows has spacewarped in zle and a tip for would be crim- 'd like to avoid the conse- f being bad lads and lasses. unexpanded BBC MIcro.

as completed Mission One but to report as follows:

inished the first mission, but at Orarra the Constrictor ne in the Safe Zone before I fore this I always had to dock unch again to meet it.

goes on to recount a meeting me ship after hyperspacing to alaxy 3.

sure that you destroyed the r after the first encounter, essence of Mission One is to t. He wonders if our famous p is a Constrictor. Well I just – it all sounds odd to me.

tip will increase your kill and in this brilliant game. Find ts with the following designa- Industrial (Corporate), Rich al (Democracy), and Any (Anarchy). An example to be laxy Three is: Bicein, Atistiso

ng 20 tons of furs at Bicein, to Atistiso and do some ting before hyperspacing to re you should buy computers rning to Bicein via Atistiso. Stuart reckons a fat wallet is the result.

A last tip from him is that you can usually get away with carrying narcotics if you also carry more of a legal substance as well: If that's true, the same will apply to firearms.

Commander L. Prout has written in to tell of a strange encounter: He locked a missile on an approaching pirate, destroyed the enemy with laser fire, but didn't get the usual TARGET LOST message as the baddie disintegrated.

Intrigued, Prout launched the missile, which was promptly destroyed by an ECM device. However, his radar screen stayed blank.

I reckon he unwittingly located the C and D ship while its cloaking device was active and that's what the missile actually locked on to. In the 16-bit versions of **Elite** the C and D ship always has visible company.

Incidentally, it's red face time. Many of you know that I have claimed ignorance of an Elite cheat program apart from the one published by Superior which, naturally, is copyright to them.

Now Commander Plonker (is he hinting?) tells me that one was published in *The Micro User*. My only excuse is that it was when my predecessor, Alice, held court on these pages.

I'm going to check the legal niceties – just in case the management sold it for a vast sum to someone else – and if all is clear I'll see what we can do about a re-run.

One other thing my friend Plonker mentioned was his wanderings around **Acheton** – a brilliant adventure. One day I shall try to complete it and give you the fruits of my toils. So much to do, and so little time to do it in...

Reader Philip Davidson is wondering whether to invest in **Exile** or **Elite**. I know which I'd go for, but then I'm not an arcade adventure expert. I have a feeling Philip ought to have asked Hac Man , who may be less biased.

James Curtis has written with a whinge (more of a warning, actually) concerning the docking computer. It takes absolutely ages to land safely using it once you are in the Safe Zone if you have the later versions of the game.

However, what really concerns James is the fact that occasionally he gets bounced by baddies while in the Safe Zone. Two things James, this is a random event – and it's good to warn readers that it might happen.

Secondly, rather than use your escape capsule, why not disengage your docking computer and then belt the living daylights out of the baddies?

Thought for the month: If they can turn out a version of **Elite** for a crummy old computer like a PC, why can't they do one for a decent machine like the Archimedes?

---

ought not to go charging off blue yonder until I had locat- an (whatever that might be) ful searching and exploring iate locality might well pay was also clear that the four be protected by puzzles.

ve been in contact with a ginners to adventuring in I'm going to weave quite a material into this solution. seasoned adventurers will d make allowances.

tside the building where **venture** began, I resisted nip straight inside. Instead I wandered steadily south along the stream until I came to the remnants of the grating that provided the entrance to the cavern system in **Colossal Adventure.**

I then continued south, and discovered that there was an orchid just out of reach, and that the next location was a cliff top.

It was clear that I had got to find a ladder or something if I were to be able to collect the orchid. So while I did some brief explorations from side to side, I made my way back to the building to see what it contained.

(To be continued next month)

Hatter's Helpline

I have just finished a mammoth task – one of the reasons why, apart from a bulging mailbag, I have been slow to answer your letters. When Electron User merged with us, my former colleague Nic (Pendragon) Outterside bequeathed me all his files of adventure hints and solutions.

These have turned out to be most valuable: They will help owners of BBC Micros as well as Electrons. Not all are full solutions, but during the next few months I will try to let readers know which adventures I ought to be able to give some sort of advice on.

Keep your solutions and hints rolling in though, because I can't manage without the help of the friends who read this column.

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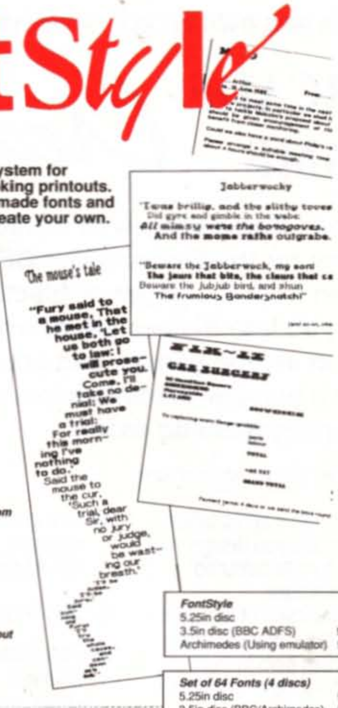

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

The mouse's tale

"Fury said to a mouse, That he met in the house, 'Let us both go to law: I will prosecute you. Come, I'll take no denial: We must have a trial: For really this morning I've nothing to do.' Said the mouse to the cur, 'Such a trial, dear Sir, with no jury or judge, would be wasting our breath.'

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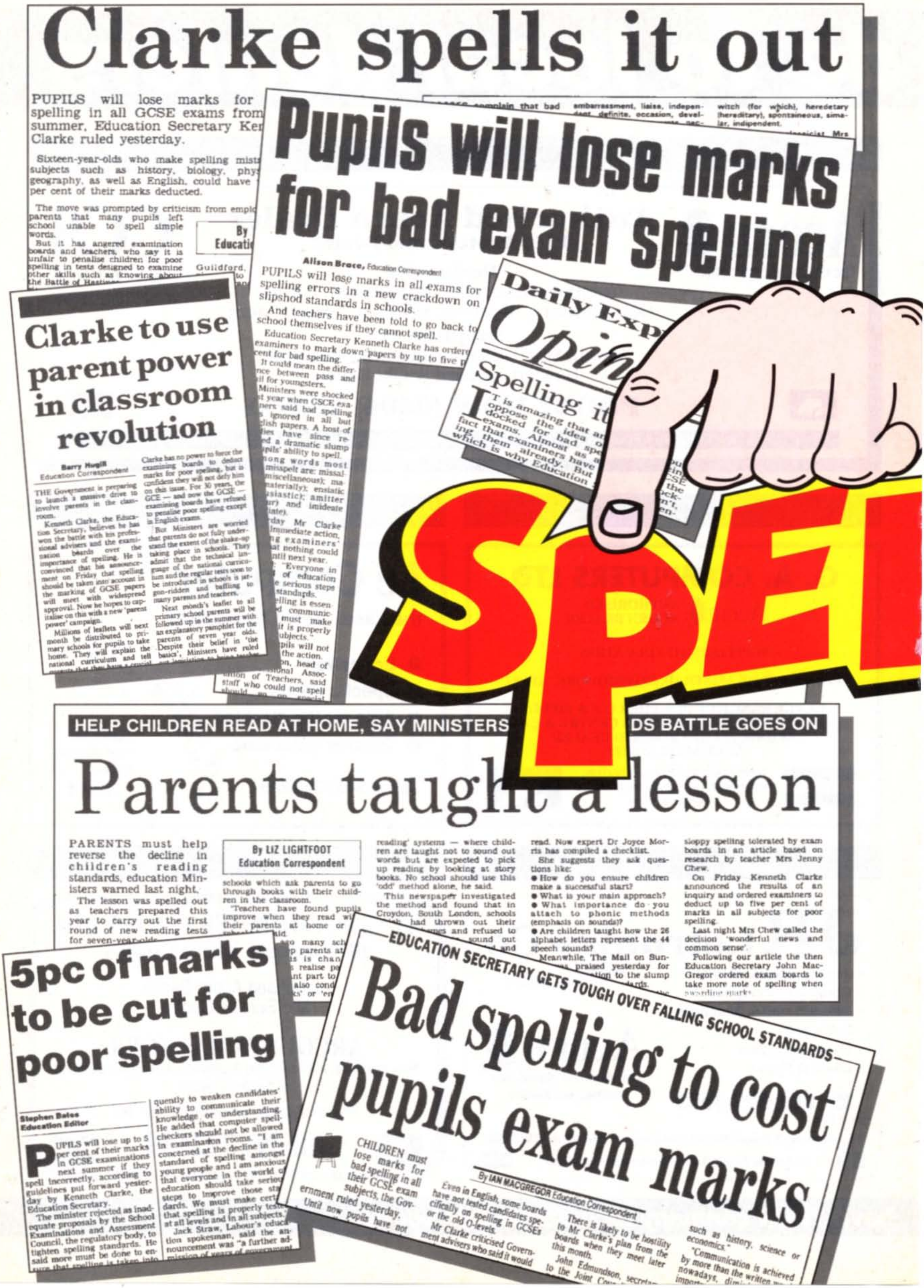

Clarke spells it out

PUPILS will lose marks for spelling in all GCSE exams from summer, Education Secretary Ker Clarke ruled yesterday.

Sixteen-year-olds who make spelling mist subjects such as history, biology, phy geography, as well as English, could have per cent of their marks deducted.

The move was prompted by criticism from emplo parents that many pupils left school unable to spell simple words.

But it has angered examination boards and teachers, who say it is unfair to penalise children for poor spelling in tests designed to examine other skills such as knowing about the Battle of Hastings

By Educati

Guildford, to

Pupils will lose marks for bad exam spelling

Alison Brace, Education Correspondent

PUPILS will lose marks in all exams for spelling errors in a new crackdown on slipshod standards in schools.

And teachers have been told to go back to school themselves if they cannot spell.

Education Secretary Kenneth Clarke has ordere examiners to mark down papers by up to five p cent for bad spelling.

It could mean the differ nce between pass and il for youngsters.

Ministers were shocked t year when GSCE exa ners said bad spelling s ignored in all but glish papers. A host of lies have since re ed a dramatic slump pils' ability to spell.

ong words most misspelt are: missal miscellaneous); ma aterially); ensiatic siastic); amitter ur) and imideate iate).

day Mr Clarke immediate action, ng examiners' at nothing could ntil next year.

"Everyone in of education e serious steps standards. elling is essen d communic must make it is properly ubjects."

pils will not the action. on, head of ional Assoc ation of Teachers, said staff who could not spell

complain that bad embarrassment, liaise, independent, definite, occasion, devel witch (for which), heredetary (hereditary), spontaineous, simalar, indipendent.

Mrs

Clarke to use parent power in classroom revolution

Barry Hugill
Education Correspondent

THE Government is preparing to launch a massive drive to involve parents in the classroom.

Kenneth Clarke, the Education Secretary, believes he has won the battle with his professional advisers and the examination boards over the importance of spelling. He is convinced that his announcement on Friday that spelling should be taken into account in the marking of GCSE papers will meet with widespread approval. Now he hopes to capitalise on this with a new 'parent power' campaign.

Millions of leaflets will next month be distributed to primary schools for pupils to take home. They will explain the national curriculum and tell

Clarke has no power to force the examining boards to deduct marks for poor spelling, but is confident they will not defy him on this issue. For 30 years, the GCE — and now the GCSE — examining boards have refused to penalise poor spelling except in English exams.

But Ministers are worried that parents do not fully understand the extent of the shake-up taking place in schools. They admit that the technical language of the national curriculum and the regular tests soon to be introduced in schools is jargon-ridden and baffling to many parents and teachers.

Next month's leaflet to all primary school parents will be followed up in the summer with an explanatory pamphlet for the parents of seven year olds. Despite their belief in 'the basics', Ministers have ruled

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Daily Exp

Opin

Spelling it

IT is amazing that ar oppose the idea o docked for bad spe exams. Almost as a fact that examiners have ing them already. But which is why Education

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HELP CHILDREN READ AT HOME, SAY MINISTERS DS BATTLE GOES ON

Parents taught a lesson

PARENTS must help reverse the decline in children's reading standards, education Ministers warned last night.

The lesson was spelled out as teachers prepared this year to carry out the first round of new reading tests for seven-year-olds

By LIZ LIGHTFOOT
Education Correspondent

schools which ask parents to go through books with their children in the classroom.

"Teachers have found pupils improve when they read wi their parents at home or

o many sch p parents at is is chan realise pe nt part to also cond ks' or 'er

reading' systems — where children are taught not to sound out words but are expected to pick up reading by looking at story books. No school should use this 'odd' method alone, he said.

This newspaper investigated the method and found that in Croydon, South London, schools had thrown out their mes and refused to sound out and

read. Now expert Dr Joyce Morris has compiled a checklist.

She suggests they ask questions like:

- How do you ensure children make a successful start?
- What is your main approach?
- What importance do you attach to phonic methods (emphasis on sounds)?
- Are children taught how the 26 alphabet letters represent the 44 speech sounds?

Meanwhile, The Mail on Sun praised yesterday for tion to the slump dards.

sloppy spelling tolerated by exam boards in an article based on research by teacher Mrs Jenny Chew.

On Friday Kenneth Clarke announced the results of an inquiry and ordered examiners to deduct up to five per cent of marks in all subjects for poor spelling.

Last night Mrs Chew called the decision 'wonderful news and common sense'.

Following our article the then Education Secretary John MacGregor ordered exam boards to take more note of spelling when awarding marks

---

5pc of marks to be cut for poor spelling

Stephen Bates
Education Editor

PUPILS will lose up to 5 per cent of their marks in GCSE examinations next summer if they spell incorrectly, according to guidelines put forward yesterday by Kenneth Clarke, the Education Secretary.

The minister rejected as inadequate proposals by the School Examinations and Assessment Council, the regulatory body, to tighten spelling standards. He said more must be done to ensure that spelling is taken into

quently to weaken candidates' ability to communicate their knowledge or understanding. He added that computer spell-checkers should not be allowed in examination rooms. "I am concerned at the decline in the standard of spelling amongst young people and I am anxious that everyone in the world o education should take seriou steps to improve those st dards. We must make cert that spelling is properly test at all levels and in all subjects."

Jack Straw, Labour's educa tion spokesman, said the announcement was "a further admission of years of government

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EDUCATION SECRETARY GETS TOUGH OVER FALLING SCHOOL STANDARDS

Bad spelling to cost pupils exam marks

By IAN MACGREGOR Education Correspondent

CHILDREN must lose marks for bad spelling in all their GCSE exam subjects, the Government ruled yesterday.

Until now pupils have not

Even in English, some boards have not tested candidates specifically on spelling in GCSEs or the old O-levels.

Mr Clarke criticised Government advisers who said it would

There is likely to be hostility to Mr Clarke's plan from the boards when they meet later this month.

John Edmundson, secretar to the Joint Cou

such as history, science or economics."

"Communication is achieved by more than the written nowadays, dimi

Mounting alarm among parents about the appalling standards of spelling among Britain's schoolchildren has finally erupted. Now Government ministers and teachers have joined parents and employers in stressing the vital importance of spelling throughout the National Curriculum.

Parents themselves are being told THEY have a crucial role to play. Education experts want to mobilise 'parent power' – to put mums and dads in the front line of the attack on poor spelling.

Many of them will find they have a powerful ally. For today, most homes have what could be the ideal means of teaching spelling – the computer.

Instead of zapping aliens it could be turned into the best weapon of all to deal a body blow to bad spelling.

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- ***Consonant Blending.*** *Covering the changes caused when two or more consonants are put together in a word*
- ***Prefixes and Suffixes.*** *Showing how changes at the beginning and end of words can alter the meaning as well as the spelling.*
- ***Word Families.*** *Assessing how different words come from the same base word but then change in spelling and pronunciation.*
- ***Irregular spelling.*** *Covering the many peculiarities of the English language, such as* receipt, thorough, bough *and* thieves.

The words are graded for children between the ages of 5 and 15 and are based on National Curriculum required reading books as well as Ginn Reading 360 – the most commonly used reading scheme in the UK – and the 123 and Away reading scheme.

SPELL! is unique. It harnesses the power of the home computer and uses it in novel ways, showing that spelling can gain a child top marks at school . . . and that practising it can be lots of fun as well.

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Rocket: *Hidden words have to be discovered in this hi-tech version of the old favourite Hangman. If they are guessed correctly the rocket will blast-off. Fail and all that's left is a load of scrap.*

Lunar Buggy: *Type fast for fun. The aim is to key in the word as it's pulled across the screen by the buggy. It has to be completed before the letters drop down a crater.*

All Mixed Up: *Jumbled letters have to be sorted out to find the scrambled word. To help beginners – and anyone else who is stuck – clues can be obtained at the press of a key.*

Conveyor Belt: *Words pass by on the screen and have to be remembered. Then they must be typed in – spelt correctly. This is a challenging test of both spelling and memory.*

In addition to using the 5,000 words provided, parents – or children – can create their own word lists for using with SPELL! This makes the package ideal for practising those hard-to-learn words, or for "Learn these spellings" homework.

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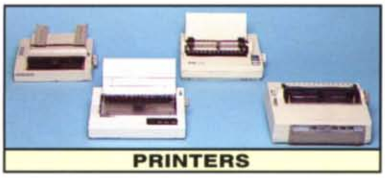
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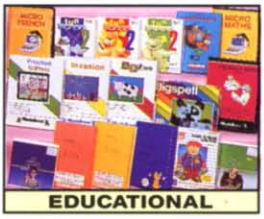
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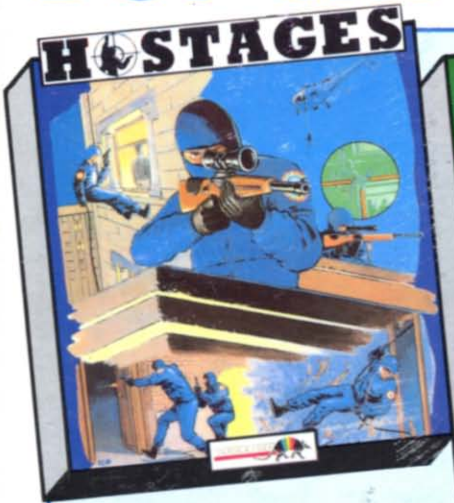

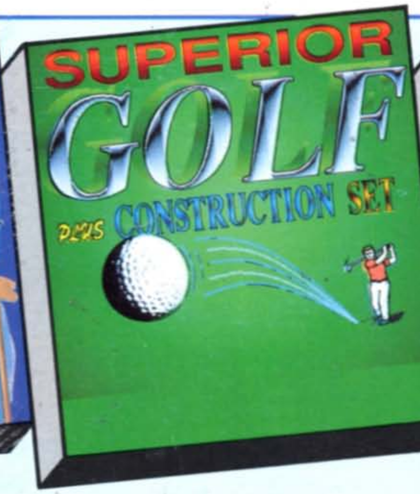

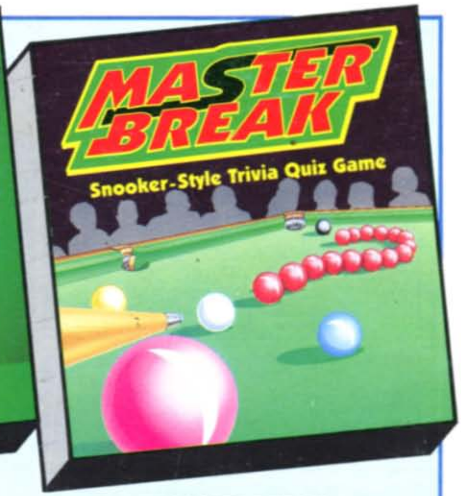

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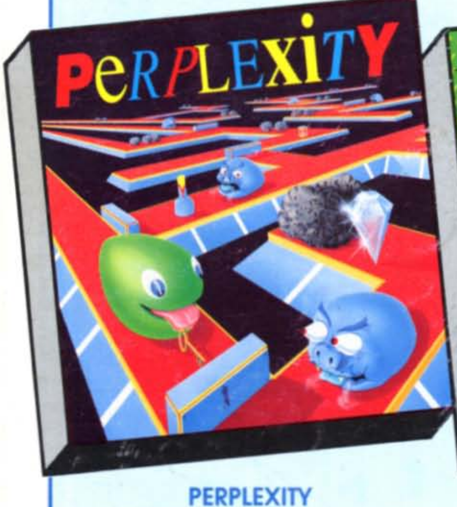

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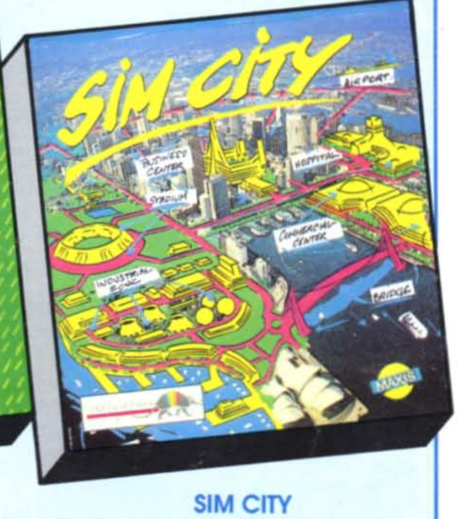

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